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AN EXTENSION OF THE KNOWN AREA OF PLEISTOCENE GLACIATION TO THE COAST RANGES OF CALIFORNIA

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By recent usage the application of the term, Coast Ranges of California, is limited to the series of roughly parallel ridges lying west of the great central valley of the state and extending from the Klamath Mountains on the northwest to the Mt. Pinos group situated southward of the extreme upper end of the San Joaquin valley. This complex of mountains around Mt. Pinos may be considered as formed by the meeting of the Coast Ranges, the Sierra Nevada, and the Sierra Madre of southern California. Without further qualification the term Coast Ranges will be used in this restricted sense in the following paper.

On maps showing the extent of Pleistocene glaciation in North America, the only portions of California commonly included are Mt. Shasta and the higher slopes of the Sierra Nevada. During the past ten years, largely through the work of Diller* and of Hershey,† it has become known that the Klamath mountains were rather extensively glaciated and that the lower limit of the ice was probably below that in the Northern Sierra. This region is shown on a map in the third volume of Chamberlain and Salisbury's "Geology" and since the publication of that work, Fairbanks and Carey‡ have added an area in Southern California by finding indications of glaciation in the San Bernardino Mountains. But hitherto it has been tacitly

Bull. 196, U. S. G. S., p. 58. †*Jour. Geol.* VIII, 1900, p. 42. ‡*Science*, 31, 1910, p. 32.

assumed that the Coast Ranges never have been subject to glaciation. This assumption has been made, apparently on the ground of their lesser elevation compared to the Sierra Nevada and without due consideration of other factors than elevation as causes of local glaciation. In studying the physiography of California, the writer has been impressed with the relatively heavy precipitation in the mountains of the Coast Province and also with the unappreciated height of many of the ranges. The further fact that the higher mountain tops in these regions at present carry snow until late in summer led to a determination to make a search for evidences of local glaciation.

The range selected for the first exploration forms the steep western rim of the upper Sacramento valley. It extends approximately north and south for about one hundred miles and the character of its topography is shown by the fact that although the country to the west is quite well settled and although the great agricultural plain of the Sacramento is on the east, there is as yet no wagon road crossing the range. The main ridge is reported as being quite uniform in height throughout the greater portion of its extent. Only two peaks have been definitely measured, Snow Mountain near the southern end being 7,039 feet in elevation (U. S. C. G. S.), and Mt. Linn near the northern end being 8,604 feet (U. S. G. S.). Hunters and sheep herders report that portions of the ridge to the southward of Snow Mountain surpass it in elevation. A map recently published at Sacramento gives one of the peaks, Mt. Ripley, as 7,500 feet without, however, quoting any authority. Snow Mountain was visited in 1909, and again, with a camera, in the past summer. Four or five square miles on the northern and eastern slopes of the peak were found to bear clearest evidences of glaciation, as will be described in detail below. The northern part merges into the Klamath Mountains, and connects with the glaciated area described by Diller and Hershey. Snow Mountain, a slightly elevated portion of the main ridge, is situated northeast of Clear Lake on the eastern boundary of Lake County. The Coast Survey monument at the top marks also the southwest corner of Glenn County, and the northwest of Colusa. Fout Springs at the eastern foot of the mountain is the most convenient base for exploring the peak. The hotel at the Springs is accessible by wagon road from Sites or from Willows.

From Fout Springs a private road leads northward up the slope of the mountain to the Caldwell ranch, at an elevation of about 2,850 feet. Thence a steep but well-marked trail leads westward over the ridge between the peaks of Snow Mountain. Distinct signs of glaciation are first seen about two miles from the summit at

5,950 feet elevation (aneroid). Here the trail crosses a terminal moraine which lies at the mouth of a hanging valley (A of the sketch model) that opens northward into the sharply incised gorge of one of the branches of Stony Creek, the main drainage channel of the region. (Fig. 1.) The moraine lies partly against a low elliptical hill which extends in the direction of the main valley. The rounded outline of this hill indicates that it was probably over-ridden by the ice. The moraine is rather closely overgrown with brush, but there are several exposures of unstratified detrital material, the fragments vary-

FIG. 1—Model of Snow Mountain, showing glaciated valleys.

ing greatly in size. The surface of the moraine is very uneven, one of the larger depressions being some 300 feet in length and about 25 feet deep. Just above the moraine at its east end is a small meadow not yet fully drained by the channel which is being cut by the overflow in the rainy season. The U-shaped valley above the meadow, heads against the main ridge of Snow Mountain without subdivision into water-cut gorges and ravines and also without the steep cirque walls so common in the granite in similar valleys in the Sierra.

The main rock of Snow Mountain in the area studied is diabasic

and weathers rapidly giving extensive talus slopes that mask all cliffs not swept by active streams. The weathering is so rapid and wide-spread that it required considerable search to obtain a specimen sufficiently unaltered to show fairly the character of the rock. Glacial markings would not usually be preserved in such rock except where it was protected from the weather. Definite glacial striæ were found in this valley, only at the eastern end of the elliptical hill already mentioned.

Going westward toward the main pass, other tributary valleys, B and C, have the same northward exposure and general characteristics as A, but lack definite terminal moraines. They are larger and their glaciers apparently merged into the glacier of the main valley. The third valley, C, has steeper cirque-like walls and its floor affords several examples of well-preserved glacial striæ with the bearings approximately parallel to each other and to the axis of the valley. The photograph reproduced in Fig. 2 is from this valley and is a fair representation of the definiteness of the striæ found in some fifteen to twenty of the best bed-rock exposures. Angular fragments with one or more faces striated were not wanting in the drift, but the striæ found on bedrock make it unnecessary to consider them as part of the evidence of glaciation. This is fortunate in a much-faulted region like the Coast Ranges, where the scratches on "slickensided" surfaces closely simulate glacial striæ. The ridge between B and C is over 100 feet in height and striæ on top show that it was covered by the ice. At D the main valley floor rises in steps of 100 and 150 feet, and the valley ends in a well-rounded head. The walls are covered with talus almost to the top, with a somewhat indefinite bench in several places at a rather uniform level over 200 feet below the top of the ridge.

Crossing the main divide of the northwest slope of the mountain, the best developed form of glacial valley was found in F, which extends nearly two miles northward before its flat floor is cut by stream erosion, into the steep gorge characteristic of the slopes below the 6,000 feet contour. The steep walls at the head of this valley inclose a little meadow, that is a duplicate of many of the smaller glacial meadows of the High Sierra. Some distance below, the valley floor descends abruptly some 200 to 300 feet to a second meadow, again duplicating characteristic Sierra forms in this step-like succession of basins. The sharp ridge to the west of this valley ends near the second meadow in the most precipitous cliff found, and from near its base runs a well-defined moraine some 25 feet in height. This is evidently the lateral moraine of valley F augmented by material from

a small tributary glacier coming down from the westward. The rock exposures in this valley show much weathering, and despite the surprisingly striking glacial forms shown in the topography, no striæ were found in the brief time given to examination.

Recrossing the divide, the north fork of the main valley, E of the sketch model, has the largest meadow of all and also some well-preserved roches-moutonnées with striæ at the base, very distinct, but too small to show well in the photograph. (Fig. 3.)

Glacial striæ are found on bedrock in several places in this valley

FIG. 2—Striæ found on bed rock in glaciated valley of Snow Mt.

and lateral moraines on both sides, the most definite being on the north slope of the lower part of the valley.

This slope is well wooded and difficult to photograph, but in the field the boulders and unstratified material of the moraine and its uneven surface are in striking contrast to the smooth talus of the main valley with its uniform and rather fine fragmental material.

Owing to lack of time and the difficulty of working in a region entirely without reliable maps, no attempt was made to fix the limits of the glaciated area in this portion of the range. The work done,

however, shows clearly the fact of glaciation and that the lower hypsometric limit is below the 6,000 feet contour.

Some consideration will now be given to the general topography and the climatic conditions and to a brief comparison with the glaciated portion of the Sierra Nevada lying in the same latitude. The remarkably flat top of the main ridge (see Fig. 4), and the rather mature topography for a mile or two of the higher slope on either side, mature where not rejuvenated by glacial erosion, all suggest that the mountain forms part of an uplifted oldland. In fact, Diller* merely from a distant view, has already described Snow Mountain

FIG. 3—Well-preserved Roches-Moutonnées in Valley F., Snow Mt.

and St. John, a nearby peak, as "rising but little above the flat portion of the Klamath peneplain."

This remnant of an old peneplain forming the summit of this portion of Snow Mountain range constituted the névé field in glacial times. Wherever by headward erosion the streams of the newer cycle initiated by the last great uplift had reduced this flat top to a narrow ridge it is impossible that any glaciers were formed.

The extremely youthful gorges of the middle slope of the mountain are rapidly working their way headward into the upper valleys and it will be very difficult if not impossible to determine exactly the lowest extension of the ice in those valleys which were glaciated.

* Bulletin 196, U. S. G. S., p. 20.

Of the upper valleys seen from the main ridge, beside those described above, the majority showed from a distance no sign of glaciation, but one or two had the U shape and the rounded heads suggestive of possible ice action. The local causes determining glaciation in these different valleys were probably exposure, relation to the snow-drifting winds, and local precipitation, the latter probably varied greatly along the range with the adaptability of the valleys on the western slope to the creation of a strong local up-draft of the moisture bearing storm winds. Some forty miles to the southward, near the summit of the next main ridge of the Coast Ranges, is a station that frequently reports to the Weather Bureau an annual precipitation of from 100 to 130 inches in a region where the surrounding stations report about one half that amount. While the cause of the heavy

FIG. 4—Flat top of the Main Ridge about one-half mile southeast of Snow Mt.

precipitation has not been carefully worked out, it appears that it is probably due to a rather steep valley opening to the winter storm winds in such a way as to act like an upward pouring funnel. The condensation in such up-pourings of nearly saturated air might well in Pleistocene times have determined a local glacier on a mountain range, the top of which was along the critical line marking the border of glaciation.

The latitude of the main peak of Snow Mountain is 39° 22′ N. Directly to the eastward in the Sierra Nevada is the glaciated region to the northward of Lake Tahoe. A comparison of the limits of glaciation and of the records of present precipitation in the two regions is of interest. As the crest of the Sierra at this latitude is some 2,000 feet higher than Snow Mountain, comparison should be made with some of the small glaciers of the ridges of the western Sierran slope. The Canyon Creek glacier heads among peaks vary-

ing from 7,000 to 8,000 feet in height and may be taken as equivalent as the parallel of 39° 25′ passes through its main valleys. The higher peaks are described as having projected above the surface of the glacier. According to the contour lines, the cirques must have headed at from 6,500 to 7,000 feet. The lower limit of the ice "is not established beyond doubt" but the morainal matter described about Graniteville indicates that it was at least as low as 5,500 feet. These upper and lower limits agree closely with those found at Snow Mountain. The present precipitation for the two regions seems also to be approximately equal.*

In the table below the few stations around Snow Mountain are compared with those of practically the same elevation and similar location in the Canyon Creek district. The figures are from the annual summary for 1909 of the California Section of the Climatological Service of the Weather Bureau:

	FEET.	INCHES.
Westward of Snow Mt.	Elevation.	Annual Precipitation.
North Lakeport.....	1,450	47.
Hullville.....	2,250	72.
Helen.....	2,750	136.
West of Canyon Cr.		
Dobbins.....	1,650	68.
Nevada City.....	2.580	76.
Bowmans Dam.....	5,500	113.

At Fout Springs, elevation 1,650 feet, at the eastern base of Snow Mountain and in the rain shadow of the range, the precipitation was over 60 inches for 1909, 30 inches falling in January. On Aug. 27 of the same year extensive snow banks were still to be found on Snow Mountain, although the *mean* temperature for June to September at Fout Springs, six miles distant was 67° F. with maxima for the same months varying from 91° to 98° F. The nearest corresponding station east of the Sierra for the Canyon Creek district is Boca, elevation 5,531 feet, where the yearly precipitation was but 37 inches.

It is, of course, recognized that so many local conditions affect the record of precipitation that the figures quoted above are merely suggestive. Their pertinence in studying the general question of Pleistocene glaciation lies in the fact that it is commonly accepted that topography was practically the same then as now and that there is no evidence of a change in our wind system. The Coast Ranges lie squarely athwart the prevailing west winds from the Pacific and, other things being equal, precipitation should be heavier at the same

* Colfax Folio, No. 66, U. S. G. S., p. 7.

elevations than in the Sierra to the eastward. The records for Snow Mountain and the Canyon Creek region show approximately equal precipitation for the same elevations and approximately the same mean temperature is indicated by the fact that at 7,000 feet snow lingers till late summer in both regions. That both regions were formerly glaciated suggests the working hypothesis that the higher portions of the Coast Ranges when situated in areas of relatively heavy precipitation were possibly subject to Pleistocene glaciation. The most promising fields for further study according to this hypothesis will now be briefly indicated.

If the reported heights of other portions of Snow Mountain are confirmed, glaciation may be found some fifteen to twenty miles southward of Snow Mountain. To the northward the higher peaks should show signs of ice action wherever they have sufficient area to have afforded gathering fields for snow. To the north of west from Snow Mountain and distant some twenty miles is Mt. San Hedrin, its rather broad flat summit rising to 6,183 feet. As rainfall increases rapidly in this direction it should be included in any comprehensive search. Southward through Central California the ranges decrease in height, Mt. Diablo nearly opposite the Golden Gate being but 3,849 feet in elevation. South of Monteray Bay the height increases again, Santa Lucia range having one peak, Santa Lucia West, that reaches to 6,000 feet. (U. S. C. G. S.) The rainfall maps of the State do not give this as an area of unusually heavy precipitation. It must be remembered, however, that the higher elevations in sparsely settled regions like this have practically no reliable data for rainfall maps. Still further southward the complex of mountains formed by the meeting of the three great mountain systems of the State is a region of relatively heavy precipitation. Several of the peaks are over 7,000 feet high and Mt. Pinos rises to 8,826 feet.

The nearest glaciated region which may be taken for comparison is the upper basin of the Kern River,* where Lawson has fixed the southern limit of glaciation at 36° 20′ (36° 16′ according to the Kaweah topographic sheet since issued). The elevation of the ridge against which head the small glacial cirques on the west side of the little Kern is about 10,000 feet, with the cirques themselves heading at from 9,000 to 9,500 feet. The rainfall maps for the higher parts of the Mt. Pinos group and for the Kern Basin region are necessarily generalized from rather distant stations. The Southern Sierra is, however, credited with the greater precipitation. In addition, the

* *Bull.* Dept. Geol., Univ. Cal., Vol. 3, Plate 31.

Kern region has the higher latitude, its southern boundary being 36° 16′ N. while Mt. Pinos is but 34° 57′ N.

The probability of finding evidences of former glaciation on Mt. Pinos would seem slight from this comparison, but the hearsay evidence concerning snow in late summer and peculiar topography is more encouraging than were similar reports from Snow Mountain. It certainly should be carefully studied, for it is very possible that the precipitation is greater than reported. It should also be noted that Mt. Pinos is on the border line of two of the climatic divisions of the State and that such a border zone may have had a proportionately greater rainfall during the climatic variations of the glacial period. Whoever undertakes to examine this region should remember that the San Andreas Rift, along the northern part of which motion occurred in the earthquake of 1906, passes only some three miles to the northward of the summit of Mt. Pinos. The irregularities of surface caused by landslides and other movements along a fault zone might be confusing in some relations to an observer predisposed to see morainal topography.

Résumé: Briefly summarizing the paper, it may be stated that clear evidence of glaciation exists on Snow Mountain; that a strong probability exists that other areas in the northern Coast Ranges were also glaciated; and that there is at least a possibility that some of the peaks of the southern Coast Ranges including the Mt. Pinos Group may have carried small Alpine or cliff glaciers.

GEOGRAPHIC INFLUENCES IN AMERICAN SLAVERY*

BY

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The Coastal Plain in Alabama and Mississippi, as in the other regions, is belted and largely covered with a veneer of Lafayette and Columbia sediments. The chief distinction between the Coastal Plain in the areas before considered and in the Western Cotton Belt is the occurrence of extensive limestone belts in the latter. (Fig. 18.) While the Lafayette and Columbia formations cover much of the Gulf Coastal Plain, they are absent or meagerly developed on the

*Concluded from *Bulletin* January and February, 1911.

limestone belts. The soils in these limestone belts are, therefore, largely residual, calcareous, and usually have a high humus content which gives the soil its black color. The soils of these belts have considerable clay and require somewhat careful preparation, but they are durable and extremely fertile.

There are two prominent limestone belts in the Coastal Plain of Alabama and Mississippi, of which the northern one was by far the more important. Both of these belts are locally known as "prairies," a word that suggests their rolling and relatively level surface. The Upper or Central Prairie has been developed on an impure clayey

FIG. 18—Map showing the principal divisions of western Cotton Belt, east of the Mississippi, in Alabama and Mississippi. The broken line shows the area from which the Graphs in Fig. 21 are made. (After Smith and Hilgard, 10th census, vol. vi, Part ii.)

limestone of Cretaceous age, known as the "rotten limestone." It is a crescent-like trough bounded on the south by a low cuesta and on the north by sandy hills of the Lafayette formation. It was and is widely known as the "Black Belt."

The Lower Prairie is less important than the Central Prairie, both with respect to their relative areas and to their soils. This belt, known locally as the "Lime Hills," has been developed on a cherty limestone. Its surface is considerably more dissected than that of the Central Prairie. Its soils are, in general, more fertile than those

of the adjacent belts, but are somewhat inferior to those of the Upper Prairie.

The Upper Loam Belt is characterized by a growth of oak, hickory and short-leaf pine. It is practically covered by the Lafayette formation which here is, in general, a loam. The soil is fairly fertile, responsive and easily tilled, but, like most loams, it did not prove durable under the one crop cultivation that prevailed during the slavery period, and, indeed, is still the prevalent method. The Upland Belt between the two limestone belts has much the same soil as the Upper Loam Belt. Generally speaking, the soils in this belt grade from loams in the northern part to sands in the southern portion. This gradation in soils is somewhat well marked by a change from oak and hickory in the north to pine forests in the south. The Central Prairie with adjacent portions of the two boundary belts is often termed the "Central Cotton Belt."

The Pine Lowlands to the southward and the small portion of the Cumberland Plateau were unimportant areas. Their soils were too

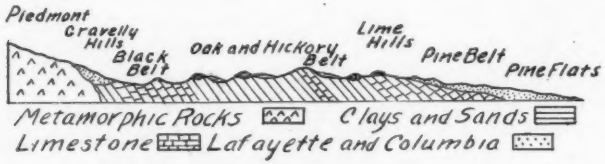


FIG. 19—Section across the Coastal Plain from the Piedmont to the Gulf in Central Alabama. (After E. A. Smith.)

sandy to offer inducement to the cotton planter. The Yazoo Bottom and Loess Belt will be included in the discussion of the Mississippi Lowland Belt.

The Ridge Belt and the middle Tennessee Valley constituted an important, though small, cotton growing region. The limestone and shale valleys between the ridges together with the alluvium along the narrow flood plains or "bottoms" of the streams gave fertile soils. The Tennessee Valley here is analogous in structure and soils to the Nashville and Louisville Basins. The River has eroded the overlying sandstones of the Plateau and opened its valley in the underlying limestones. (Fig. 20.) A narrow strip of fertile alluvium along the river is flanked on either side by fertile limestone soils. These latter soils grade into the sandy soils of the uplands, whose local name, "The Barrens," suggest their infertility.

Such were the divisions of that part of the Western Cotton Belt

that were included in the Coastal Plain. A profile and section of this belt is shown in Fig. 19.*

It will, perhaps, be better to take up first the responses of slavery to the Cotton Belt of the Coastal Plain although, chronologically, the institution was established in the lower portion of the Mississippi Lowland at a much earlier date. We have noted that this Western Cotton Belt was settled by an overflow from the older slave states. The development here is especially interesting from an economic standpoint. Here slavery was largely a business proposition and slaves were located with reference to returns on the investment. In the East, slaves were often inherited and slavery had a patriarchal cast.† The institution in the West, therefore, was especially mobile and responsive to geographic environment. Here, too, the plantation system developed as in the East as an effective organization of slave labor analogous to the development of the modern trusts.‡ The holdings of the pioneers were restricted or diminished both by the competitive bidding for public lands by the large slave holder and by the tempting prices which the capitalistic slaveholder could offer for the lands of the small farmer.

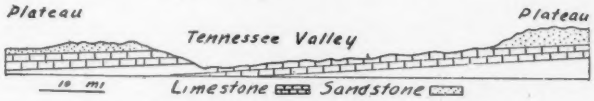


FIG. 20—Section across the Tennessee Valley in Alabama.

The census of 1820 shows a preliminary invasion of this region in two directions. The slave system of the Eastern Cotton Belt was spreading westward. Also, extending northward from the Mobile area, was a sparse slave population. The Indian lands not yet open to settlement lay in the fertile cotton belt. A decade later slavery was crowding on these lands from the north, south and east with a result that by 1834 the production of cotton in Alabama and Mississippi equaled that of the Carolinas and Georgia. In this same year the crop in Alabama, Mississippi, and Louisiana exceeded by half the crop in the Tobacco South and the Old Cotton South.§ The cheap, productive lands were rapidly draining slaves from the older slave states, especially from the Tobacco South. Title to and possession of the Indian lands soon became possible and in the decade

* Vol. VI, Soils of Alabama, by E. A. Smith, and Vol. V, Soils of Mississippi, by E. W. Hilgard, 10th census.

† F. J. Turner, Colonization of the West, *Amer. Hist. Rev.*, Vol. II, 1905-'06.

‡ U. B. Phillips, The Origin and Growth of Southern Black Belts, *Amer. Hist. Rev.*, Vol. 11, 1905-'06.

§ F. J. Turner, "Rise of the New West," New York and London, 1906.

from 1830 to 1840 slavery spread into the middle portion of the Coastal Plain, and from 1840 to 1860 it became markedly dense in the Black Belt.

The Lower Prairie is not delimited in mapping the slave population even in 1860. During the slavery period the Federal census did not, as a rule, give the population of the county sub-divisions in the South. The Lower Prairie is a narrow belt and counties in this belt usually include large areas of the adjacent belts whose sparse slave population lowers the average that the maps show. Moreover, the adjustment of slavery to soils was at best very incomplete. The settlement and development of areas was not gradual but intermittent.

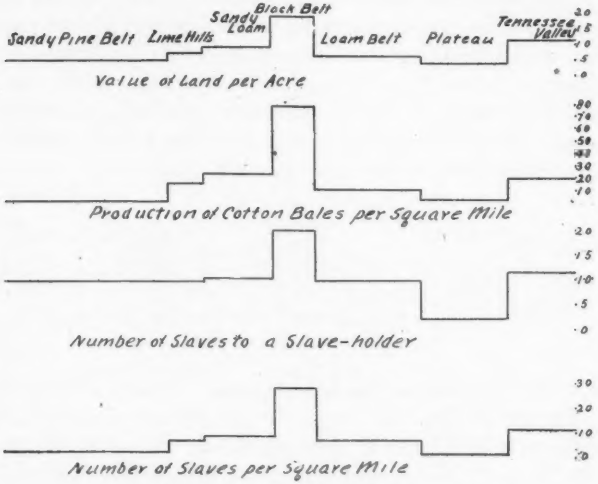


FIG. 21—Graphs showing Data from the Belt shown in Fig. 18. Data from the census of 1860.

The Upper Prairie was not by 1860 so well settled that the slave owners were migrating and the belt was still gaining rather than losing slaves. It is interesting to note that in 1880, twenty years after the slavery period, the Lower Prairie shows the expectable high cotton production that sharply differentiates it from adjacent belts.

The graphs in Fig. 21 well summarize the contrasts in the different areas. Cotton production with its concomitant land values and slave densities, are seen to be at their maxima in the Black Belt, and at their minima in the Plateau. The belts adjacent to the Black Belt show high averages both because of their natural fertility and because counties in the Black Belt often extend into the adjacent

belts. The Pine Lowlands were of minor importance. The plantation system represented by the third graph shows a general parallelism to the other graphs.

The Gulf Coastal Plain is broken midway by the Mississippi Lowland, a lowland with an average width of 50 to 75 miles and an approximate length of 500 miles. (Fig. 22.) On the west this lowland extends for long distances up the main tributary rivers. Into the Coastal Plain the Mississippi has sunk a shallow trench which it is now for the most part, aggrading. The soils in this lowland are alluvial.

FIG. 22—Sketch Map of the Mississippi Lowlands. The soil area shown in Fig. 23, is cross-lined.

When an aggrading stream overflows its flood plain, its velocity suffers its first check on the flood plain near the stream, and here in consequence the heavy materials and a considerable proportion of its lighter material are deposited. The finer silts and clays are laid down farther back from the stream. The topographical results of such a process are typically an elevated belt, the natural levee, along the stream with lower land and swamps farther back from the stream. The soils on the natural levee are sandy or loamy, while the soils on the lowlands are heavy silts and clays. A typical soil section in passing from a stream to the back lands would include consecutively a narrow belt of sand or sandy loam along the stream, paralleled by a belt of sandy loam which grades into the clays and silts of the back lands (Fig. 23). A gradation soil in the better drained clay and silt areas is the famous "buckshot" soil, so called from the fact that after it is plowed it often dries into small grains or "buckshot." Such a combination of chemical fertility and porosity makes this type one of the most fertile soils in the world. Frequently there are low ridges in this belt which mark old stream courses that are now deserted.

During slave times, and, indeed, at present practically only the natural levees are in cultivation. Here on the "front lands" were the plantations, each of which usually had a river frontage for easy shipment. These natural levees, often isolated from each other by miles of swamps, were natural social and oftentimes political units and were frequently referred to as "country," for example, Lafourche country in lower Louisiana. A typical area of alluvial soils is shown in Fig. 23.

A relatively narrow belt of loess fringes most of the lowland, especially in its eastern margin. This belt is considered in connection with the lowland since it was closely identified therewith in crops and in the development of slavery. For a considerable distance back from the lowland, the loess belt is well dissected owing to the steep gradient of the streams and the loose, unconsolidated condition of the loess and its underlying formations. This dissected belt is in consequence known as the "Cane Hills." The hill tops are often arable but there is a considerable proportion of the area that is too rough for cultivation. Further back from the lowlands, the diminished dissection of the loess belt finds expression in the local name "Flat Hills." The loess belt as a whole is extremely fertile.

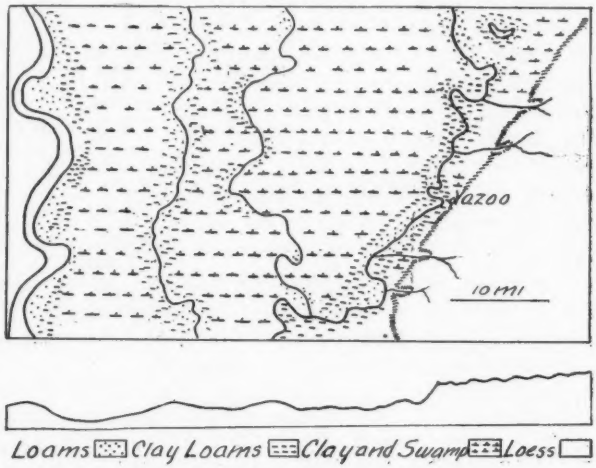


FIG. 23—Soil Map and Profile of a portion of the Mississippi Lowlands and Loess Bluffs in Mississippi. (Soil Data from the maps of the U. S. Soil Survey; Profile from the Map of the Alluvial Valley of the Mississippi Valley, by the Mississippi River Commission, 1887.)

While Louisiana is the most typical lowland state, it should be noted that the lowlands include but a fraction of the state's total area, and this small proportion of lowland to upland is true in greater degree of the other states lying in part in this division. It is the extreme productiveness of the lowland that gives a common impression that Louisiana especially is largely alluvial lowland. Much of the state is covered by the Lafayette and Columbia formations and has the soils characteristic of those formations.

It was in the alluvial lowland of Louisiana that one of the minor

slave crops was developed. Sugar cane is a variety of the grass family that thrives best in a hot, sunny, humid climate where frosts are infrequent. A heavy loam, tenacious of moisture, is a favorable soil.* Southern Louisiana with its high temperature, copious and evenly distributed rainfall and heavy, fertile soils, offered a productive field for cane cultivation.

Cane was introduced into Louisiana in the middle of the eighteenth century but did not become commercially important until the beginning of the next century, at about the time of the extension of cotton culture. It did not, like rice on the South Atlantic seaboard,

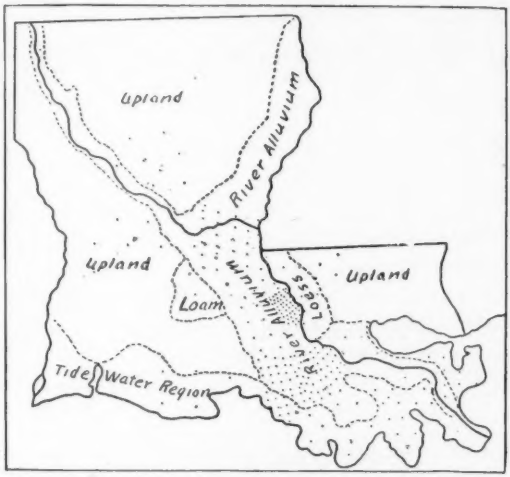


FIG. 24—Map showing the production of sugar in Louisiana, 1860. Density of production is indicated by the spacing of dots.

prepare the way for cotton culture. Rather the two crops developed side by side. Cane culture, being intensive and profitable, was nearly as well adapted to slave labor as cotton culture. The cane producing areas in Louisiana were largely in the lowland below the Red River together with an important area on the loess belt. (Fig. 24.) The Louisiana area in 1860 produced 96 per cent. of the entire cane sugar crop of the United States, and 91 per cent. of cane molasses. So far as soils were concerned, cotton would grow well in this area, especially on the lighter soils. However, the heavy autumn rains often destroyed or damaged the crop when it was ready for picking.

Slavery existed in the lower part of the alluvial lowland in early

* W. C. Stubbs, "Sugar Cane," *Rept.* of the Louisiana Experiment Station, Vol. 1.

colonial times, but its principal expansion, like that of the rest of the western Cotton Belt, was deferred until the second decade of the nineteenth century when sugar and cotton culture became prominent. In 1810, when the first Federal census of this region was taken, a considerable slave density was shown on the delta and the loess. In ten years the slave area had spread most upon the loess and the slave density had increased in the lowland above New Orleans.

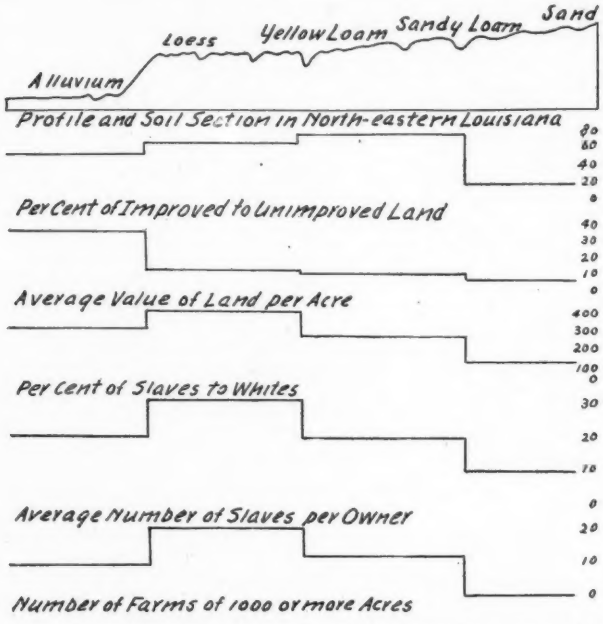


FIG. 25—Soil section and slavery factors on the Mississippi Lowland and adjacent belts, 1860.

By 1840 there was a heavy slave density in the lowlands in Louisiana, and in the Yazoo Bottoms of Mississippi and in the contiguous loess belt. In the next two decades the density increased on the lowland and loess, but it extended much farther north on the loess than on the lowland. Sugar in the southern, and cotton in the northern parts were the main crops, although in the Kentucky region considerable tobacco was grown.

The graphs taken for 1860 in Figure 25 are interesting and, for the most part, typical of this region. The section is taken along the

northern boundary of Louisiana and extends westward along the sandy Pine Lowland, the soil of which is comparatively infertile; the Sandy Loam Belt, known as the Oak and Hickory lands, with a soil of fair fertility; the Yellow Loam Belt which is transitional between the Sandy Loam Belt and the Loess Belt; the fertile Loess Belt, and lastly a county (Point Coupeé) in the Lowland.

Less than half the lowlands was under cultivation in this area and it is probable that the percentage here was above that of the lowlands as a whole. Point Coupée County was early settled, and most of the available land and also the lands that admitted easy reclamation, were under cultivation. The higher percentage of improved lands in the loam belt than in the loess belt is to be explained in part by the dissected surface of the western part of the loess belt. A considerable proportion of the loess is "rough land" and not capable of easy cultivation. The Pine Lowlands were too unproductive to pay for clearing their forests.

The high value of the arable loess land brings up the average land value in this belt above that of the adjacent loam belt. The average value of land in the lowland is higher than in the other belts, despite the fact that there is a high percentage of waste area in the lowland. There are no statistics in 1860 to show the relative acreage of the arable lands in the lowland, but the high value of the front lands carried the average value of the whole to a high figure. The relatively low values of land in the loess in contrast with the adjacent belts is not typical of the loess belt as a whole. Further north the loess belt had a higher relative value.

The last three graphs approximately represent the development of the plantation system. These reach their maxima in the Loess Belt. The highest slave percentage, the largest plantations, and the largest individual slave ownership are found in the loess belt. The lower percentages of these factors in the alluvial belt point to smaller plantations, a larger number of owners and perhaps a more intensive cultivation. The Pine Belt in all these factors is insignificant.

Cultivation by slave labor was characteristically extensive rather than intensive, an exploitation rather than a development. The usual procedure was to search for fertile lands, to exhaust them by careless, extensive cultivation, and then to move on to fresh lands. As a geographic response slave cultivation did not bring out the possibility of soil production under careful tillage.

We have noted how the development of the western Cotton Belt drew the slaves from the Tobacco South, and in less degree from the eastern Cotton Belt. By 1860 slavery had secured a strong foot-

hold on the Coastal Plain of Texas. In this state the extension is again resumed of the Black Belt and loam and sandy belts which are separated from homologous areas in Mississippi and Alabama by the Mississippi Lowland. These belts end in the southwestern part of the state (Fig. 26). It was here, had slavery continued a decade or so beyond 1860, that a new expansion would have occurred. The wisdom of the pro-slavery statesmen in securing Texas for slavery is indicated by this state's increasing rank in cotton production. By 1900, 26 per cent. of the cotton grown in the United States was produced in Texas, and much of the Texas crop was grown in the Black

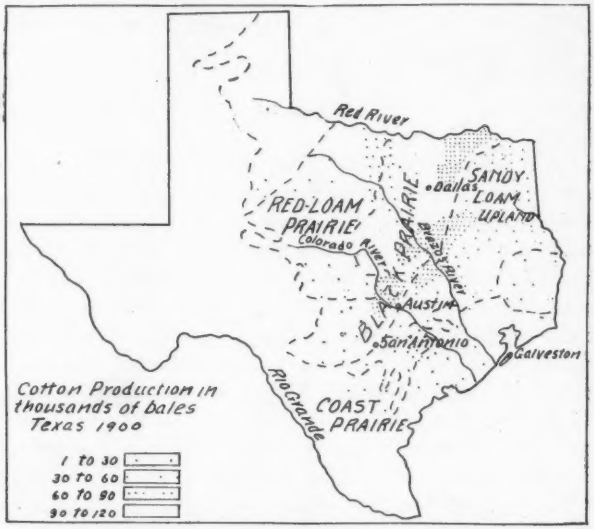
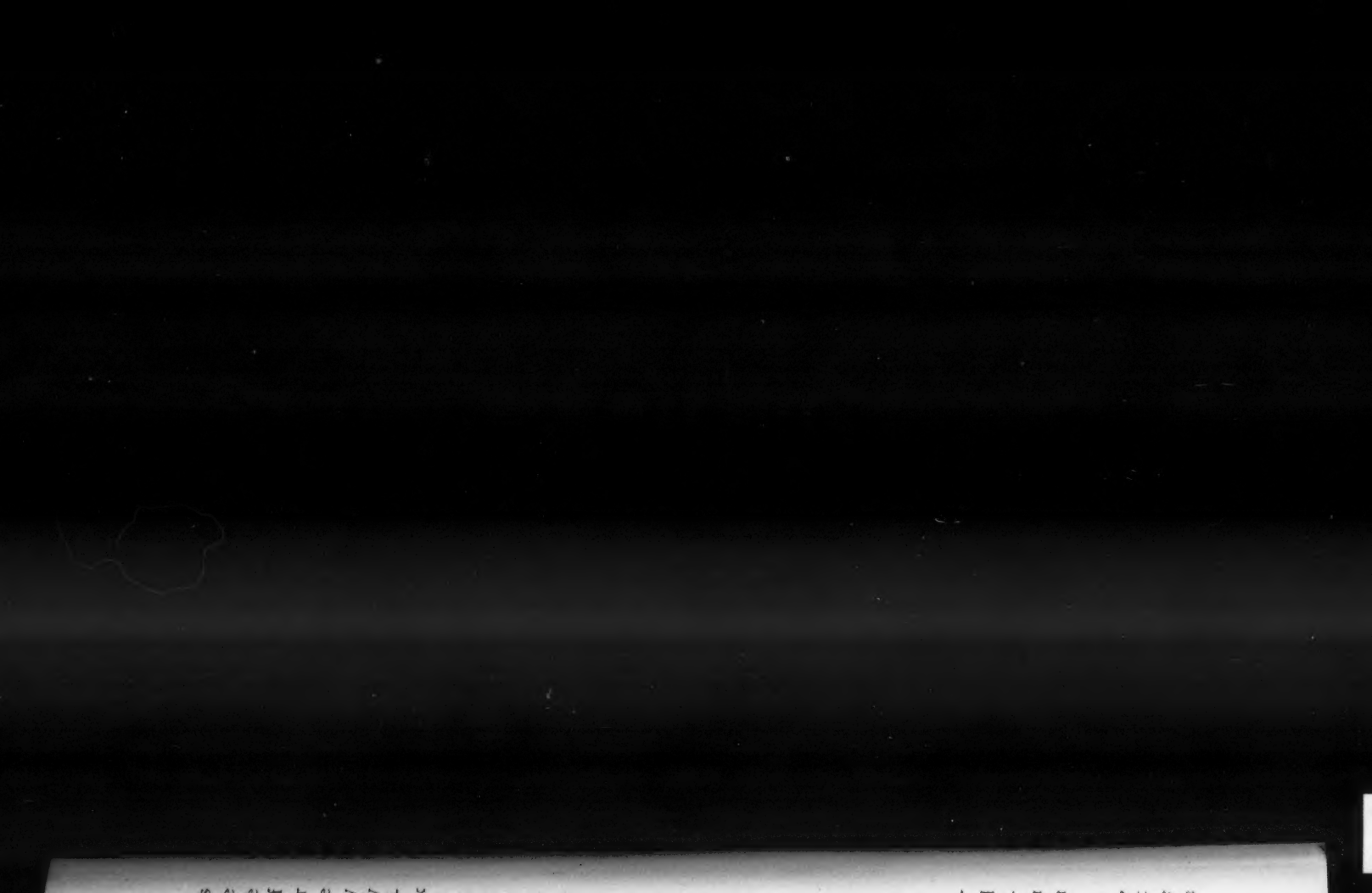


FIG. 26—Cotton production, 1900, and main soil belts of Texas. (Soil belts after Loughridge, 10th census, Vol. 5, Part 1.)

Prairie and adjacent belts which are homologous with the similar belts east of the Mississippi. (Fig. 26.) Had slavery been allowed to expand, the Texas portion of the Western Cotton Belt would undoubtedly have drawn the slaves from the Carolinas and Georgia in the same manner as the Southern Belt reduced the Tobacco South to a slave raising region.

Résumé: Although slavery was introduced into all the colonies, it ultimately became important only in those geographic regions that permitted the profitable cultivation of the slave crops, and these crops were limited to a warm climate. On the basis of the main



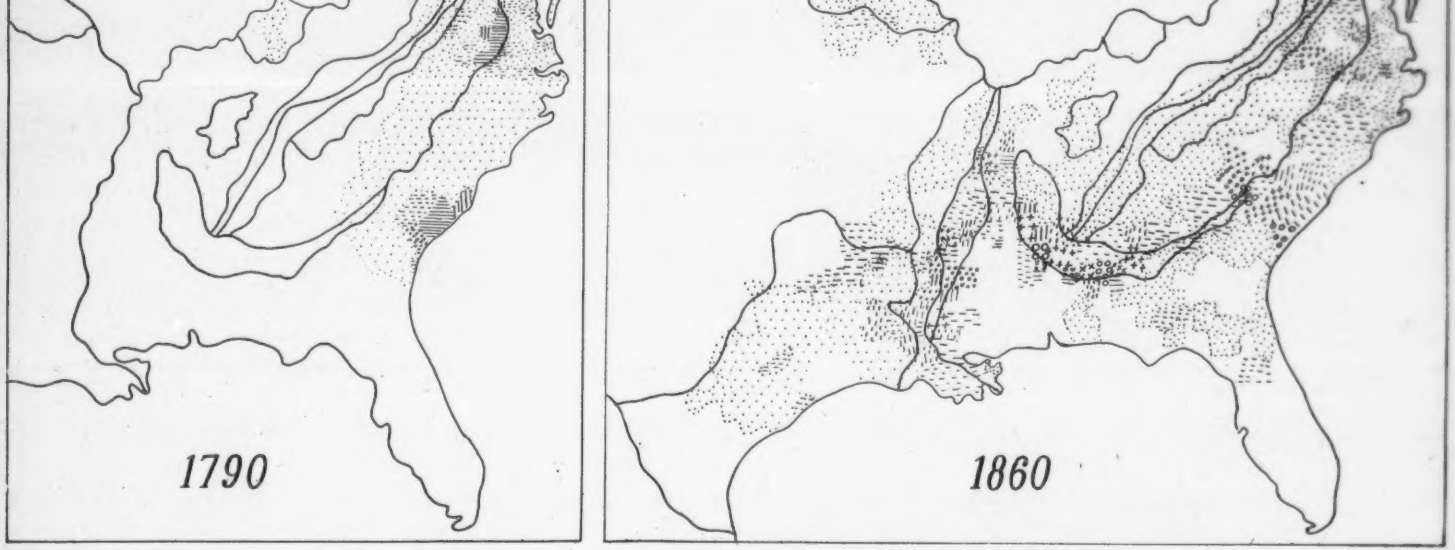
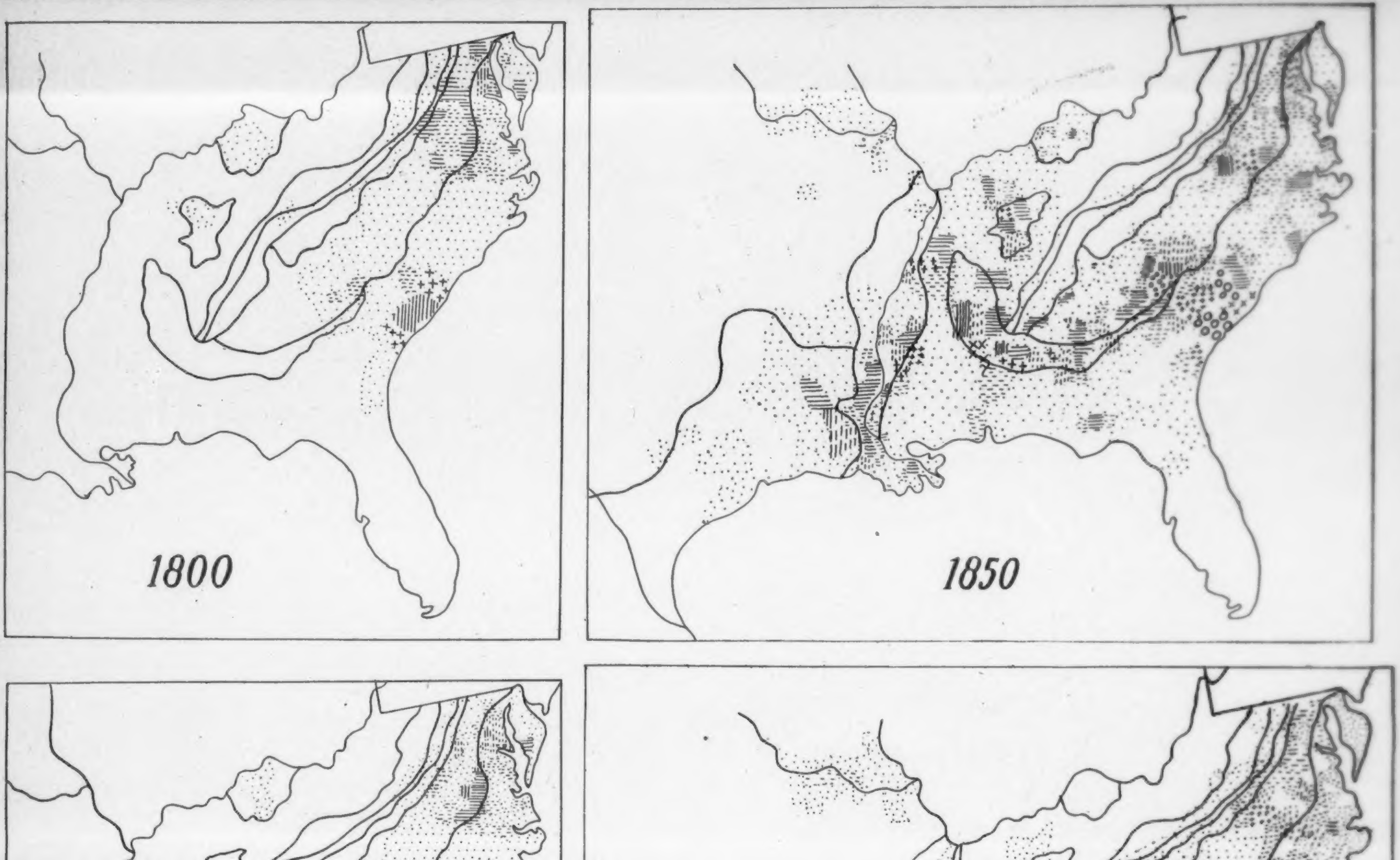
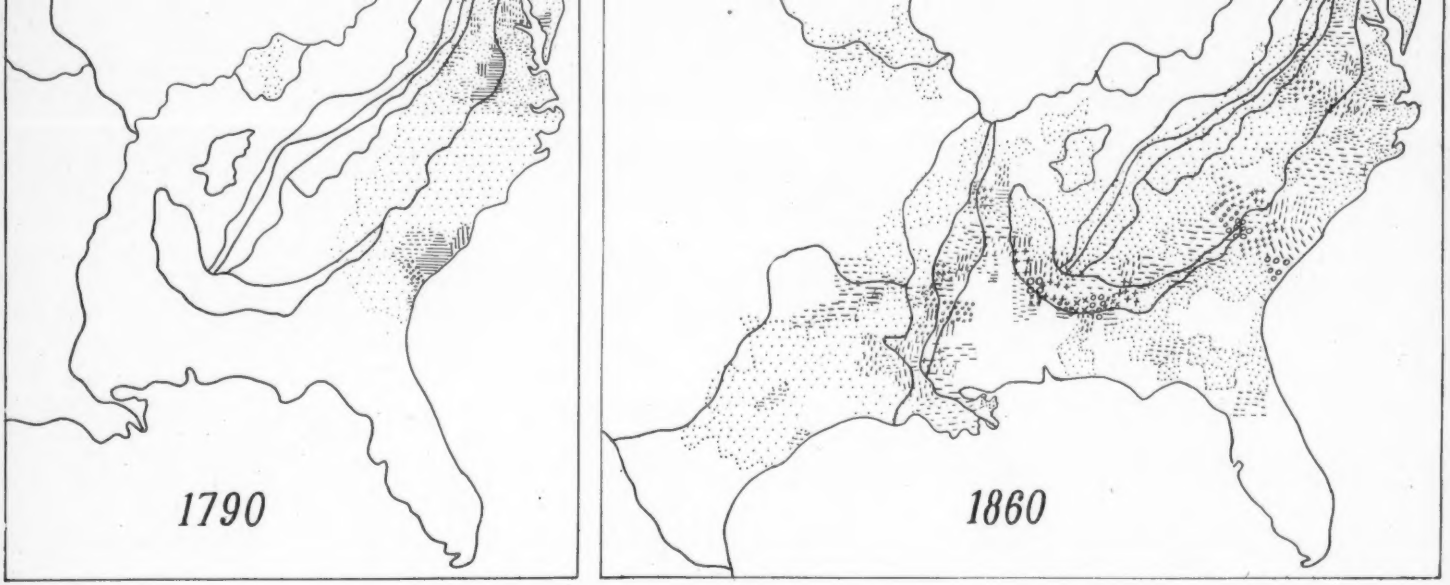

1790
1860
Number of Slaves in Thousands
1 to 5
5 to 7
7 to 9
9 to 11
11 to 13
13 to 15
15 to 17
17 to 19
19 to 21
21 to 23
23 to 25

FIG. 27.


1800
1850


1790
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Number of Slaves in Thousands
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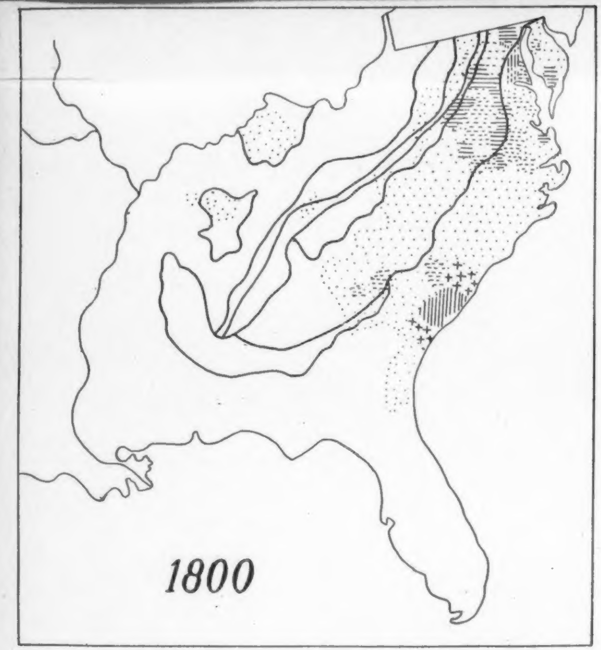
FIG. 27.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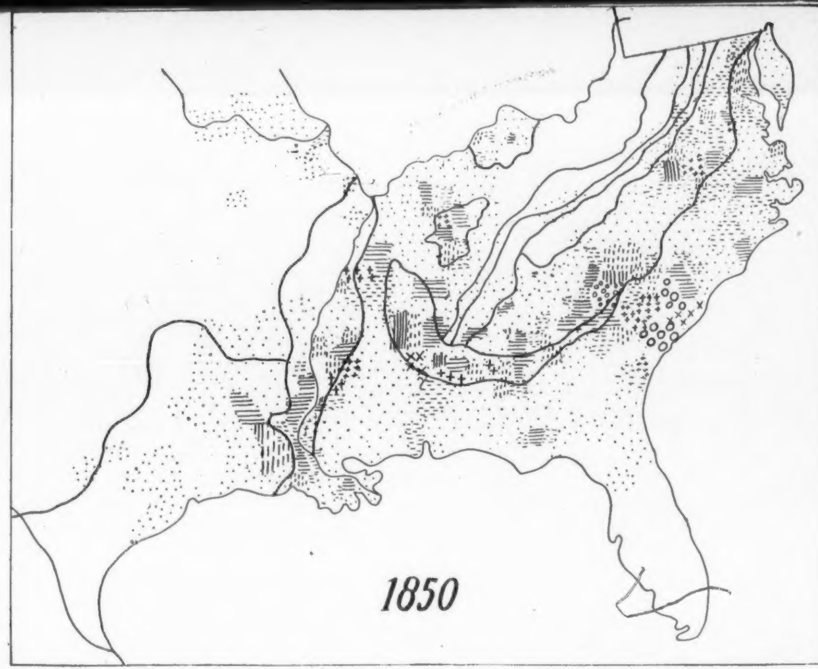
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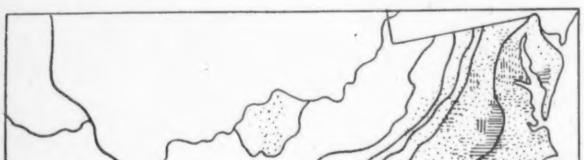
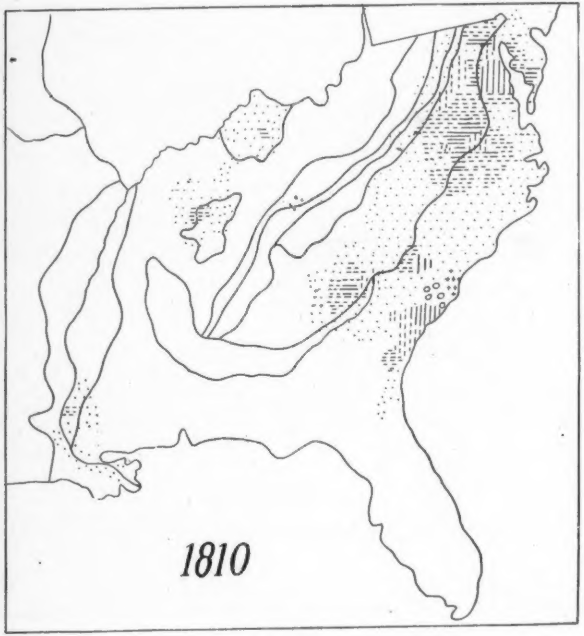
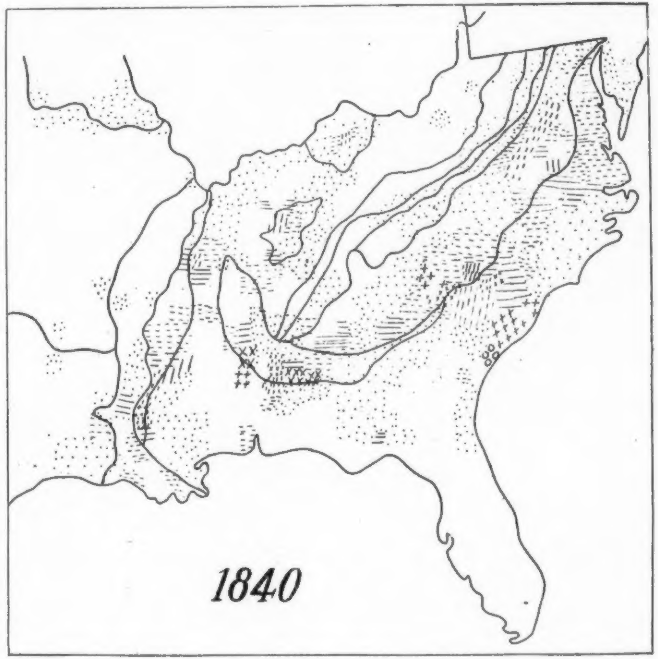
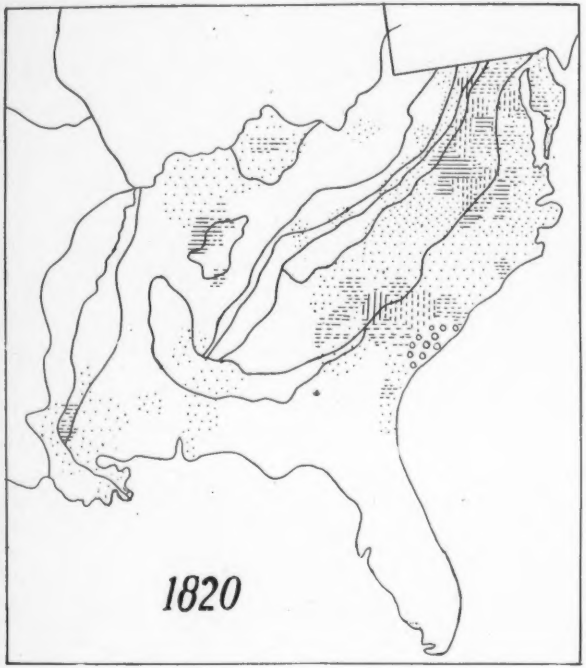


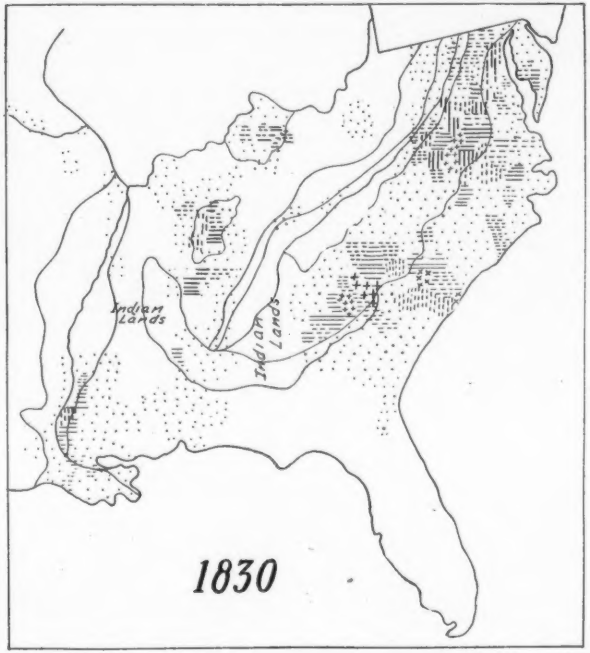


1810



1840


1820


Indian Lands
Indian Lands
1830

slave crop, the South may conveniently be divided into two parts. each having varied topography and soils. The Tobacco South lay north of the isotherm which conditioned the profitable cultivation of cotton. Tobacco here was the main crop with cereals as subsidiary crops. Beginning on the Coastal Plain, the culture of tobacco with its concomitant system of slave labor, expanded first to the Piedmont, later to the Great Valley and Ridge Belt, and finally to western Kentucky and Tennessee, being concentrated especially in the two limestone basins of those states.

In early colonial times, slavery acquired and maintained a strong foothold in the Sea Islands, and the adjacent mainland in South Carolina and Georgia with rice, indigo and sea island cotton as the main crops. The Cotton South began when upland cotton became available, and slavery and upland cotton cultivation expanded together. The first notable expansion was from the Sea Island region to the Piedmont and inner Coastal Plain in South Carolina and Georgia, which became known as the Eastern Cotton Belt. The last expansion was into the Western Cotton Belt which included mainly the Gulf Coastal Plain and the Mississippi Lowland.

SLEEPING SICKNESS IN UGANDA

BY

PETER MAC QUEEN*

About twenty miles from Kampala lies the hospital Kyetume, where I was told there were 700 patients suffering from sleeping sickness. I decided to stop over night at the hospital. I was most hospitably received by Dr. Claude Marshall, who was then in charge. Sleeping sickness came into Uganda about four years ago. It is caused by the bite of the tsetse fly, which was brought from the Congo by the caravans passing through with ivory to the coast. In four years 250,000 of the most promising natives of Africa have died from the terrible disease. No man who has had an attack of sleeping sickness has ever yet authentically recovered.

The hospital is laid out among beautiful gardens, on a hill overlooking a splendid agricultural section. Most of the patients are treated in a village which the English Government has established.

* By the courtesy of Messrs. L. C. Page & Company, Boston, these extracts on Sleeping Sickness in Uganda are here reproduced from Mr. Mac Queen's excellent book "In Wildest Africa."

Those who are not seriously ill are kept in the village until the disease has made considerable progress. After that they are brought into the general buildings of the hospital itself. The disease will kill a man in any space of time, running from two days to two years. No absolute cure of the disease has yet been found.

Great Britain is making gigantic efforts to thwart the power of this dreadful foe. Already she has under the care of skilled physicians no less than 20,000 patients. The people living along the shores of Lake Victoria Nyanza have been removed back into the country several miles, and every possible attempt has been made to exterminate the tsetse fly. The most successful attempt yet made has been the planting of a certain shrub in the marshes where the fly lives. The shrub is certain death to the tsetse fly. The area infected by the sleeping sickness thus far has been confined to the islands in the northwest of Lake Victoria Nyanza, and the shoreland from Entebbe to Jinja, a distance of about ninety miles. But the fear is that the disease will spread through all the provinces of the Upper Nile; and at the present rate of decrease in population it is estimated that in twenty-five years the entire population of Uganda will have disappeared. It might also spread to the Sudan, Rhodesia and Portuguese and Africa and decimate half the continent. The tsetse fly, whose scientific name is *glossina palpalis,* breeds in moist and swampy land. Scientists believe that it gets some of its virus from the body of the crocodile. Dr. Koch declares that it also feeds on the bodies of waterfowl frequenting swamps. If it bites a person after it has imbibed this virus, or after it has bitten a human being infected with the sleeping sickness, that person is almost certain to develop the fatal malady.

On the island of Buvuma it was estimated four years ago that there were 20,000 healthy people; to-day I am told there are less than twenty individuals. In the Sesse Islands, of a population of 30,000 four years ago, only 12,000 remain to-day. These are examples of the devastation of this gruesome pest. The British authorities have established six great hospitals or stations in Uganda for the treatment of sleeping sickness. They contain nearly 20,000 patients and are located as follows: (1) Sesse Island; (2) Kyetume, near Kampala; (3) Busu in Usoga; (4) Bulumasi; (5) Island of Buvuma; (6) Entebbe. The treatment followed in these hospitals is an injection of atoxyl, composed of arsenic, aniline and carbolic acid, discovered by Dr. Koch, the famous German specialist on tuberculosis. During 1908, in his official report to the Minister of the Interior with regard to the progress made by the German expedition

sent to East Africa to investigate the sleeping sickness, Professor Koch announced that he had discovered a specific against sleeping sickness similar to that which the doctors already possess against malaria in quinine. The remedy, which is a preparation of arsenic, is called atoxyl, and destroys the trypanosomes, the germs of the disease.

Professor Koch's close inspection of the habits of the *glossina palpalis,* which British investigation had already proved to be a disseminator of the disease, led him to the conclusion that the sleeping sickness can be spread also by other insects, such as for instance, the *glossina fusca.* The *glossina* lives principally on the banks of lakes, among stones, dried branches and plants; and feeds on the blood of the waterfowl which frequent the surface of the water, and also on the blood of crocodiles. These latter animals, Professor Koch declares are one of the chief reasons for the existence of the *glossina* in the Victoria Nyanza territory.

In order to study the *glossina* and the sleeping sickness together, Professor Koch availed himself of the offer of an empty mission-house placed at his disposal by the British authorities at Bengala, in the Sesse Islands, to the northwest of the Victoria Nyanza. The Professor came to the conclusion that the only remedy which would be efficacious would be one that destroyed the trypanosomes in the infected persons, as quinine annihilates malaria parasites. After various experiments, Professor Koch decided to employ atoxyl injections of half a gramme in solution, which proved most efficacious and caused no harm. Six hours after the subcutaneous injections had been made the trypanosomes were unchanged, but eight hours after there was no sign of trypanosomes, while the general condition of the patient had improved. In three weeks patients who were seriously ill when the treatment began, and who, without atoxyl, would certainly have died, had improved to such an extent as to leave no doubt in the Professor's mind of the efficacy of the remedy.

Unfortunately, a week after Dr. Koch's report appeared, Sir P. Monson wrote to the *Times* that it was optimistic, that a relapse invariably occurred, and that trypanosomes were found in the blood even after a year's alleged cure. He gave cases where monkeys that had been inoculated with the blood of patients who had undergone arsenic treatment soon weakened and died of sleeping sickness.

In August, 1907, Sir Hesketh Bell, the Governor of Uganda, put forward a scheme for the suppression of sleeping sickness and the Treasury authorized the expenditure of the funds required for this work. According to Sir Hesketh Bell's plan, the natives were to be

removed from the fly-infested district on the shores of Lake Victoria to healthy locations inland. The sick were to be placed in segregation camps, where they will undergo the so-called atoxyl treatment. It was estimated that some 20,000 people would have to be dealt with in this manner. It was further intended that all landing stages along the shore of the Victoria Nyanza should be freed from the presence of the tsetse fly by means of a complete clearance of all vegetation. Fords, ferries, and waterholes were to be similarly dealt with, and it was hoped that, by constant and consistent efforts in this direction, sleeping sickness would gradually be stamped out in Uganda. It is a matter for satisfaction that the chiefs fully appreciate the steps that are being taken, and are working loyally with the Government in helping to stamp out what has already proved such a terrible scourge in Uganda.

The work that I saw interested me very much. Twice a day the doctor went through the hospital, treating the patients, cheering and encouraging the down-hearted, ordering food and medicine for the weak. Attended by an interpreter, he asked the various symptoms and explained to me, as we went along, the course and ravages of the disease.

The hospital itself consists of a series of buildings in the native daub and wattle style, common to Uganda, with palm thatched roofs and overhanging eaves. Down the centre of each building there is a wide aisle, and on either side of it are rows of beds, of native manufacture, whereon the patients lie covered with a blanket. Fires are kindled at intervals down this aisle, and most of the patients are too sick to do their own cooking. Some of the victims are young men and women who have strength to go about, and these live in the village in clean sanitary huts, of the ordinary Uganda type. I have seen patients brought in one night and buried the next day. On the other hand, the doctor showed me men who had had the disease for nearly two years and who were still able to keep on their feet.

EXPLORING THE CANADIAN NORTHWEST

Prof. John Macoun of the Geological Survey of Canada wrote a while ago:

"There can be no question about the value of the land north of the Saskatchewan, and settlers going in there are assured of three essentials—wood, water and hay for cattle. * * * The low altitude, and the long day are fixed conditions and will always remain the same."

A vast area north of the north branch of the Saskatchewan is considerably lower in altitude than the southern part of the Canadian prairie. Prince Albert is nearly 500 feet lower than Regina and Stanley on the Churchill River is 260 feet lower than Prince Albert; and, of course the summer days are longer than in the more southern latitudes. These and other facts have for several years encouraged the Canadian Government to study the question whether conditions to the north of the Saskatchewan favor grain growing, and whether there are natural resources of timber, hay, fish and game sufficient to increase the value of these lands to incoming settlers. The Canadian Department of the Interior has just published the latest report on these investigations in Canada's new northwest.*

Mr. Crean's report of his two years' work, including information collected from others, covers an area of approximately 40,000,0000 acres. The purpose of his work was to ascertain the value of this area for farming, lumbering and mining. He was expected to report upon the nature of the soil, the various kinds of forest trees, the extent, size and quality of timber, the economic minerals, if any, valuable water power, etc.

The large map published with the report shows that the territory studied embraces most of the region between 54°—57° N. Lat. and 104°—113° W. Long. Sprinkled over it are an enormous number of lakes, the names of some of which, such as Lake Montreal, Lac la Plonge, Green Lake and others have long appeared on our maps. Mr. Crean says that large numbers of lakes have never been mapped. His routes are in red, and Hudson Bay posts, Catholic and Protestant Missions and Indian villages are scattered over the sheet; and notes in red type indicate the nature of the country. Remarks such as

*New Northwest Exploration. Report of Exploration by Frank J. P. Crean, C. E., in Saskatchewan and Alberta, north of the surveyed area, 1908-1909. Department of the Interior, Ottawa, 1910.

"fine agricultural land," "wheat, oats, barley and vegetables," "heavily timbered valleys," "fine spruce and poplar" are sprinkled over the sheet; near the 57th parallel, lands are marked as "fine" and "barley, oats and splendid gardens," is the legend printed with some of these northern missions and villages. The map is very interesting for the insight it gives into the resources and prospects of a great region to the north of present white settlement.

In 1908, Mr. Crean traversed the eastern half of this area, completing his work in the western half in 1909. He found a sprinkling of whites—missionaries, hunters, trappers and traders, and an important number of Indians. Some of the whites have for years been

FIG. 1—Green Lake Settlement. 54° 15′ N.

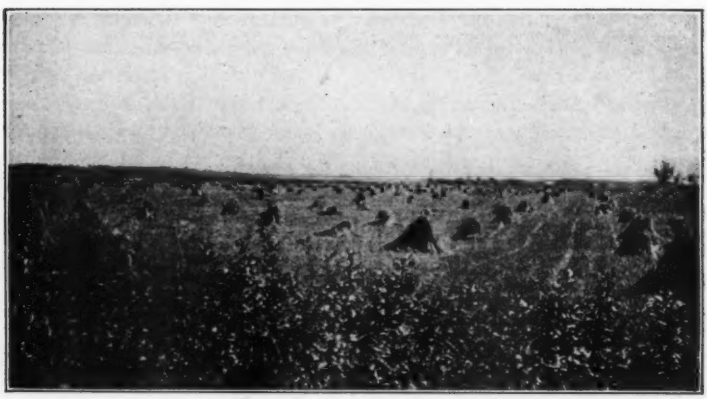


FIG. 2—Farm at Mt. Nebo on the Green Lake Trail, 65 miles from Prince Albert. About 53° 45′ N.

raising vegetables and cereals, with abundant hay for their horses and cattle, but little has been known of them for their habitat has been almost inaccessible, and its resources and capabilities have never been carefully studied.

In the southern part of this district, the country is broken by deep coulées in the prairie. Farther north the country becomes flat and low, with many swamps. In the area visited in 1908, embracing about 22,000,000 acres, Mr. Crean estimates that fully 5,000,000 acres are suitable for settlement as soon as surveyed and made accessible by roads; and an area of about 12,000,000 acres of swamp or land, probably too wet at present for successful cultivation, may be reclaimed

FIG. 3—Banner oats at English Mission, Lac la Plonge. 55° 5′ N. Wheat is grown successfully here.

FIG. 4—Sawmill at R. C. Mission, Lac la Plonge. Run by water power. 55° 7′ N.

at little expense. He believes that all this swamp will eventually repay the cost of reclamation.

The soils are light loam with blue clay or sandy clay subsoils, and much of the agriculture land appears to be as fertile as could be desired. Of course, the winter is cold, but no colder or longer than in some of the settled parts of Saskatchewan. At Portage la Loche (56° 45′ N. Lat.) the potato tops had not been touched with frost on Sept. 17. The rainfall is ample though not excessive, and the heaviest rains occur in the early summer, when rain is most needed for farming. The snowfall is generally not heavy, seldom exceeding eighteen inches.

Along the Big River in the southern part of the tract, is a splendid ranching country, hay abounds and water and shelter are easily

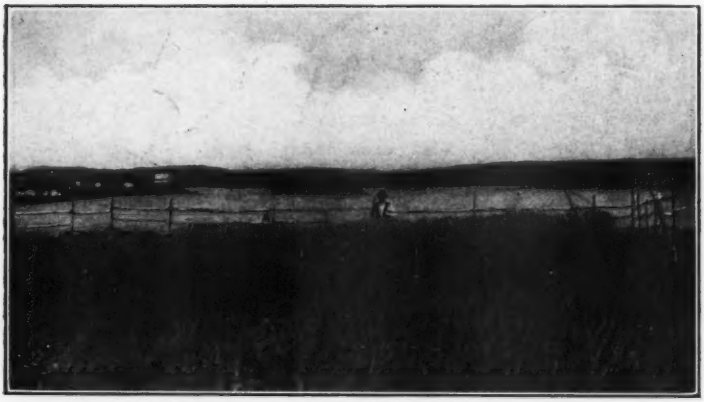


FIG. 5—Preston Wheat Field, Stanley, Churchill River. 55° 30′ N.

obtained. The valley of the Clearwater River, which crosses the 57th parallel would supply a cattle range, which Mr. Crean thinks would be hard to beat. He believes that mixed farming will be the industry best adapted for the entire tract explored. Game of all kinds is numerous, and moose are still plentiful, though they are being killed in large numbers by the natives and wolves. The staple food of the Indian is fish, and he has an ample supply. White fish are found in all the myriad lakes and rivers; most of the country is covered with small timber, not generally of commercial value, though usually there is ample timber for the use of the settlers, but not enough to supply any lumber industry.

In the northern part of the region north of the Churchill River,

is a district of much promise from a mineral point of view. There is an enormous amount of water power which may be utilized to create industrial centers. On almost every stream there are sites where small water power may easily be developed for grist mills, saw mills, pumping and lighting plants.

Mr. Crean says that wheat may be grown in almost any part of this northern region. Of course northern latitudes increase the likelihood of summer frosts; but wheat, barley and oats are now matured every season in portions of this area. The settlers at Meadow Lake say that two loads of hay will winter each head of stock; and hay grows in such profusion that two loads to the animal may easily be obtained even for a large herd of cattle. He believes that pigs also will thrive well in the north and though this territory

FIG. 6—Potatoes at English Mission, Lac la Plonge. 55° 5′ N.

can never compete with the more southerly latitudes in the wheat market, still by judicious mixed farming it will eventually be equally productive and support a dense, thriving population.

The Meadow Lake section, north of the 54th parallel, is practically a prairie and contains in Mr. Crean's opinion, some of the very finest farming land in Canada. The soil is rich, there being in some areas 24 inches of black loam, with clay subsoil. The open prairie country is about twelve miles wide and extends from Meadow Lake about fifty miles west. At an Indian farm instructor's house, he saw a plot of five acres of the finest oats; and in the gardens are practically all the vegetables raised in southern Canada. One of the traders, a half-breed named Cyprian Morin, has raised barley and

vegetables every year for twenty years, and has eighty head of cattle and thirty-five horses.

The beautiful valley of the Clearwater River, near the 57th parallel is covered with pea vine, vetch, red-top, and upland hay, growing in profusion. It will, in Mr. Crean's opinion, make a magnificent cattle range and farming country. There are large open prairies, the grass is fine and the soil is a good loam, with a sandy clay subsoil. When the railroad now planned reaches McMurray on the Athabaska, there is no doubt that a large agricultural settlement will take possession of this fine valley.

The statements here reproduced from Mr. Crean's report are sufficient to show that, in all probability, Canada has a large reserve for settlement in the territory to the north of the lands now surveyed in Alberta and Saskatchewan. Before many years this great region will have steam connections with the settled regions to the south, and then the utilization of the northern territory will begin. There is little doubt that in the near future this part of Canada will be the home of thousands of farmers and stock raisers.

NOTES ON THE DESCRIPTION OF LAND FORMS.—IV.

WELLINGTON HARBOR, NEW ZEALAND. By what method can a scientific observer who has seen and studied a certain district give the best account of it to a scientific reader who has not seen it? The method followed in some essays is to begin with an empirical description of the observed facts, arranged in order of their distribution and phrased in popular language, and then on a later page, after some account of the geology of the district has been given, to present the geographical facts again, but this time in genetic order and in technical, explanatory phrase. Yet the very author who follows this two-fold method in his geographical presentation may in the same essay introduce his geological matter immediately in thoroughly technical style. Perhaps the reason for the adoption of methods so unlike for the two sciences is a semi-conscious feeling that geography is not yet ripe for so advanced a treatment as is proper in geology; that geographical descriptions must be at least introduced in an empirical and popular form, even if they are intended for readers who can at once understand geological technicalities, and who can on a later page than the first understand geographical technicalities also.

Anyone who has had experience in discussing problems of this kind with geographical authors differing in temperament and training must know that

preferences as to method and style vary over a wide range. It is probable that some readers of these notes will prefer, even in articles for trained readers of scientific journals, that geographical presentation should be made in the two-fold method, first empirical and then, after some geological pages, explanatory; they may not approve of the more direct method which introduces explanations promptly at the beginning, by giving as terse and technical an explanatory outline of the whole story as is consistent with ready reading, and then devoting to the presentation of additional details the space that the other method occupies with duplicate statements.

While I have no desire to conceal my own preference for direct and technical presentation in scientific journals—whatever other methods may be preferred for elementary schools or for popular lectures—it is not at all my wish to imply that there is anything like a right or wrong way of proceeding; nor is the least my intention to impugn the value of the results presented in the two-fold method. The matter that I wish to place before the readers of the BULLETIN is that conscious and intentional experiments should be made in the use of various methods of description before any one method is adopted; and that the best one of many possible methods should be then selected for use, always with due consideration of the space at the author's disposal and of the class of readers addressed. If conscious experiment of this kind is not made, the writer's preference may be based on habit accidentally formed before acquaintance was gained with various alternative methods, rather than on careful choice after abundant trial. It is the making of an open-minded choice of method that is here urged. Only after such choice is made should habit be formed.

In order to give specific illustration of the question at issue as regards the two-fold and the direct method of geographical description, I may cite an article on "The Physiography of Wellington Harbor," by my friend, J. M. Bell, Director of the Geological Survey of New Zealand (*Trans.* N. Z. Inst., xlii, 1909, 534-540). The article bears internal evidence of being based on careful observation from which well considered theoretical conclusions are derived, and after one has read it through a clear picture of an interesting district is gained. There can hardly be two opinions on these points, although as the article is unfortunately only six pages long, there is not space enough for the full presentation of all the facts on which the conclusions are grounded. The value of the article is evident. The question here raised concerns only the kind of presentation from which the mature geographical reader shall most readily acquire a clear understanding of the district that is treated. Its chief conclusions are as follows:

Wellington Harbor—or Port Nicholson as it is often called—is a land-locked body of water, measuring nine miles north and south by five miles east and west, which opens southward at the southern end of the northern island of

New Zealand. It results from the irregular displacement of several north-south fault blocks, the fragments of an extensive peneplain that had, in an earlier cycle of erosion, been worn down on folded argillites and grauwackes. The uplifted blocks, now maturely dissected and in some places subdued, form ridges and highlands on the east, north and west. The depressed and submerged blocks determine the irregular area of the harbor. The eastern border is comparatively simple, as if it followed a nearly straight scarp between the uplifted and depressed areas. The harbor mouth is narrowed to a mile on the southeast by the non-submerged southern part of two western ridge-blocks which farther north dip under water; thus the inner harbor gains its full width of five miles; but it is here and there interrupted by islets and shoals, as if the depressed blocks were incompletely drowned. The eastern one of the two ridges by which the harbor mouth is narrowed seems at first to have been an island, but it is now attached to its western neighbor by a sand isthmus which divides what was originally a second entrance to the harbor into a short outer and a longer inner bay. The oblique inner or northwestern border of the harbor is the scarp of a northeast-southwest master fault, still so steep and so little dissected that the streams from the highland have not yet incised their narrow gorges to its base; below the gorge mouths the streams plunge down in abrupt waterfaults. [It is here to be regretted that the narrow limits of the article excluded statement of the relation between the strike of the folded strata and the trend of the inferred master fault, for in case these two directions diverge the evidence of faulting would be much stronger than if they were parallel.] Since the time of displacement, the original northeastern extension of the harbor has been much reduced by the delta of Hutt river, which, broadening as it grew forward, has at present a frontal width of nearly two and one-half miles. In the same period, strong but immature sea cliffs have been cut on the southern slope of the exposed fault blocks along the outer coast; and less pronounced shore work has been done around the protected coast line of the harbor. Very recently a slight elevation, partly accomplished during the earthquake of 1855, has revealed a narrow strip of the marine platform forward from the cliffs of the outer coast, and has laid bare some flats well adapted for settlement around the border of the harbor. Wellington is partly built on one of these flats on the west, where the full width of the harbor is gained between the partly submerged blocks on the south and the scarp of the oblique master fault on the north.

Even without the aid of the outline map which accompanies the original article, the reader ought to gain a fairly good idea of Wellington harbor from this explanatory description, which is compiled from Bell's statement with a few changes of phraseology. Each element of the description suggests a definite and easily conceived form. A peneplain worn on folded argillites and grauwackes is readily pictured. The divisions of the peneplain into fault blocks,

generally trending north and south, and the displacement of the blocks in a specified manner, with the resulting submergence of the harbor area, offer no difficulty of understanding. The mature dissection of the uplifted blocks is very readily imagined. The filling of part of the harbor area by the forward growth of Hutt river delta, the carving of great and small sea cliffs on the outer and inner coast lines, and the building of a sand isthmus between the partly submerged ridges are additional consequences of normal and marine agencies in the cycle of erosion introduced by the displacement. The revelation of the wave-cut platform in front of the outer cliffs and of flats around the harbor border is a simple result of recent elevation. [No mention is made of terraces in the delta.] All of this explanatory matter is indeed so plain that one may understand it at the first reading; but it is from the later, not from the earlier, pages of Bell's paper that the explanatory statements are taken. If we omit certain local details and local names, and paraphrase a few words, his first page reads as follows:

"The harbor is a fine sheet of water about nine miles long by five miles wide, land locked save at a comparatively narrow entrance. . . . A number of islets and two small islands . . . . appear on its surface, while several shoals . . . . render navigation somewhat difficult in places. High hills almost completely surround the harbor, rising in general in steep slopes from the water's edge. There are, however, several fair sized areas and small patches of level or gradually sloping land close to the edge of the harbor. By far the largest of these is that which forms the relatively wide valley of the Hutt river, extending northeastwards from the northeastern end of the harbor. This plain has a width of nearly two miles and a half near the harbor, and gradually narrows as it extends inland. Westward from the narrow [entrance of the harbor] is a low range of hills. . . . These are connected with . . . . [a second range of] hills, to the west, by a narrow sand isthmus between . . . . . and . . . . . bays. The [hills of the second range] . . . . attain their maximum altitude in Mt. . . . . which rises some 648 ft. above the sea. To their westward is the low and relatively flat land on which the city of Wellington stands, having a slope on the northern side to the harbor and on the southern side to . . . . . bay. Westward of the city rise the . . . . . hills. These are partially separated by the . . . . . valley from the main range of hills extending northeastwards along the edge of the harbor and bordering the Hutt valley to the westward. A view from any prominent position on the hills around . . . . [the harbor] discloses an elevated country stretching in all directions, broken by narrow valleys and deep ravines. If this elevated country be viewed from a point on the eastern side of the harbor, one is struck with the general uniformity in height attained by the crests of the various hills on the west side. Since this even skyline is quite independent of the structure of the country rocks, which consist of highly folded and shattered argillites and grauwackes, it apparently exhibits an elevated plain of erosion, or peneplain."

Only after this empirical introduction do we find in three and one-half pages, devoted partly to geological history, partly to physiographic evolution, the statements from which the explanatory account of the harbor as given above is condensed. The local names of various hills and bays are omitted above, in order to emphasize the fact that they have no descriptive value whatever for a reader who does not know the district concerned.

The empirical quality of the introduction is maintained with remarkable faithfulness, even to treating forms so easily understood as a river delta and an island-tying sand isthmus in terms independent of their manifest origin. But is it helpful to the mature reader to proceed so cautiously? Is it really worth while to be so deliberate as to allow three pages of text to intervene between the empirical statement of immediately observable facts regarding a delta and a sand isthmus, and the simple explanation of their origin. Is it desirable to insert nearly a page of geological history between the empirical description of the harbor and the explanatory account of it as a submerged graben? In answering these questions the reader should bear in mind that, when the argillites and grauwackes are first mentioned, their present condition is described at once in explanatory fashion by the phrase, "highly folded and shattered"; that is, their deformed structure is presented not in empirical terms of direct observations, but in genetic terms that are indicative of the inferred processes, which, according to current geological theory, have produced it.

Again, such terms as anticline and syncline, paleozoic and mesozoic, are used without introduction, on the perfectly reasonable assumption that the readers to whom the article is addressed will immediately understand them. Yet so elementary a conception as a delta or a peneplain is approached empirically and inductively, as if it were unknown, or as if the interpretation that it implies were hazardous. There is perhaps an appearance of safety in an inductive presentation of this kind; but surely the manner in which a result is presented has nothing to do with its safety. That important quality depends on the care in observation and the skill in theorizing that were exercised during the investigation that precedes presentation. The correspondingly important quality in presentation is clearness, with which the deliberate pace of induction and the paraphrases of empirical description are not necessarily associated.

An experimental test of the relative efficiency of the two-fold and the direct methods may be made fairly well, if a geographical reader of these notes will ask some patient and geographically minded friend to listen while the empirical and the explanatory descriptions, as given above, are read to him; and then to express his opinion on the advantage of introducing the explanatory by the empirical statement, as compared with entering at once upon the explanatory statement: but the experiment can be better made if the geographically minded reader will try the two methods of procedure for himself, when he next has occasion to write an article of his own.

W. M. Davis.

GEOGRAPHICAL RECORD

THE AMERICAN GEOGRAPHICAL SOCIETY

MEETING OF THE SOCIETY. A regular meeting of the Society was held at the Engineering Societies' Building, No. 29 West Thirty-ninth St., on Tuesday evening, February 21st, 1911. Vice-President Greenough in the Chair.

The following persons were elected to Fellowship:

William Gould Brokaw,
Stephen Pearson Brown,
Frederick S. Dellenbaugh,
William B. Dunning,
Max Pam,
J. G. Phelps Stokes,
Charles C. Thain,
John Clark Udall,
Paul M. Warburg,
George H. Warner.

The Chairman then introduced Mrs. Charles Schaeffer who addressed the Society on "At the Sources of the Athabaska and Saskatchewan Rivers." For several years Mrs. Schaeffer has made long excursions among the Canadian Rockies to the north of the Canadian Pacific R.R. Her lecture related to the mountain system as far north as Mt. Robson, which has seldom been described and pictured for lecture audiences. The stereopticon views were superior and the large audience listened with great interest to Mrs. Schaeffer's discourse.

AMERICA

PROF. ELLSWORTH HUNTINGTON WILL RENEW HIS WORK IN THE SOUTHWEST. Prof. Huntington is going to the southwestern part of the country again this season as Research Associate of the Carnegie Institution, to continue the work of last year. His researches last season were confined chiefly to regions where archæologists had never done much and he now plans to visit some of the well-known ruins. He will spend a month or more in New Mexico, another in Arizona and then he proposes to go on to California for two or three months, to study the same problems there under quite different conditions.

EXPEDITION TO LOWER CALIFORNIA. The steamer *Albatross*, sailed from San Diego on Feb. 25, on a two months' collecting Expedition to Lower California. The American Museum of Natural History and the United States Bureau of Fisheries, are cöoperating in the expedition. Dr. Charles H. Townsend, Acting Director of the Museum, commands it, and is accompanied by seven investigators and collectors. The work will begin with deep sea dredging to Guadalupe Island, 250 miles from San Diego extending to depths of two and a half miles. Mr. G. C. Bell of the American Museum will make molds of the various deep sea fishes and invertebrates as soon as collected A fishery survey of the peninsula of Lower California will be made and there will also be work on shore. The peninsula will be studied on both coasts and the collectors will procure mammals, birds, reptiles and fishes, many of which are of special interest because they are peculiar to the locality.

GEOLOGICAL WORK ALONG THE SANTE FÉ R.R. A recent investigation of the geology of parts of West Central New Mexico and Central Arizona from Albu-

querque to the region west of the Grand Canyon of the Colorado has been carried on by N. H. Darton (A Reconnaissance of Parts of Western New Mexico and Northern Arizona, *Bull.* 435, U. S. Geol. Surv., 1910) in connection with the study of underground water. An interesting feature of this study is the detailed geological map (Pl. XVI) of part of the Grand Canyon showing, on Matthes' superior topographic map, the relation of the several resistent and weak rock strata to the cliffs and slopes of the canyon walls. The mapping of faults in the region emphasizes the fact that the main canyon is a stream valley, pure and simple, and absolutely independent of fault rifts. Several tributary canyons follow the general line of faults, but these are doubtless due to zones of weakness here rather than original fault cracks. The canyons of Bright Angel Creek and Garden Creek, the latter followed by the Cameron Trail from the Grand Canyon railway station to the Colorado river, follow a fault but are not otherwise different from the neighboring tributaries. The photographic illustrations in the report are superb. LAWRENCE MARTIN.

RELATION OF CLIMATE TO CRANBERRY GROWING. The cultivation of cranberries, mainly confined to Massachusetts, New Jersey, and Wisconsin, has climatic relationships which have recently been studied by H. J. Cox (Frost and Temperature Conditions in the Cranberry Marshes of Wisconsin, U. S. Dept. of Agric., Weather Bureau Bull. T, No. 443, 1910). The annual crop in Massachusetts is about 300,000 barrels, in New Jersey 150,000 and in Wisconsin 75,000; and in each state, where the cranberries are always raised on bottom lands, there is much danger from frost. If the cranberry lands are (a) drained, (b) sanded, or (c) cultivated, reducing leaf area, less heat is lost at night by radiation, more heat is gained during the daytime, and the danger from frost is reduced. Prediction of frost by Weather Bureau observers is of the greatest value to cranberry growers. LAWRENCE MARTIN.

ASSOCIATION OF AMERICAN GEOGRAPHERS. The seventh annual meeting was held at Pittsburg, Dec. 29-31. About twenty-five members were present and the attendance of members and non-members ranged from twenty-five to fifty. Twenty-five papers were read, not including those presented by title. The subject of President H. C. Cowles' address was: "The Causes of Vegetative Cycles." Evening lectures were given by Dr. Cowles on the subject "The Origin and Destiny of the Everglades" and by Prof. Mark Jefferson, on "Rocky Mountain Forms." A round table conference conducted by Prof. Rollin D. Salisbury of the University of Chicago upon the topic "The Purposes of Geographic Instruction and the Phases of the Subject best Adapted to these Purposes" was marked by strong interest and vigorous discussion.

The officers nominated for 1911, were duly elected and the full Council for the year is as follows: President, Ralph S. Tarr; First Vice-President, Alfred H. Brooks; Second Vice-President, Henry G. Bryant; Secretary, Albert Perry Brigham; Treasurer, Nevin M. Fenneman; Councillors; R. E. Dodge, W. M. Davis, Herbert E. Gregory.

The following were appointed delegates to the Tenth International Geographical Congress to be held in Rome, in October, 1911: W. M. Davis, H. C. Cowles, R. S. Tarr, H. W. Fairbanks, A. P. Brigham, and Cyrus C. Adams.

A. J. COLLIER. Mr. Collier, formerly connected with the U. S. Geological Survey, has accepted a position as head of the Department of Geology in the University of Oregon.

SOURCE OF THE AMAZON. In a paper by Dr. Wilhelm Sievers on his recent explorations among the Cordilleras of Ecuador and Peru, (*Zeitsch.* of the Berlin Geogr. Soc., No. 8, 1910), he treats in detail of his work among the headwaters of the Marañon, which resulted in his determination, apparently, of the ultimate source of the Amazon. He says that the distinguished explorer Raimondi was mistaken when he announced the Nupe as the most important of the three rivers whose united waters form the Upper Marañon. Dr. Sievers found that the Lauicocha R. carries much more water, extends farther south, and is the greatest of the Marañon sources. He traced this river to its ultimate springs on a snow mountain called San Lorenzo in the Cordillera de Huayhuash and to the lagoons Santa Ana, Caballo Cocha, Anka Cocha and Tinki Cocha about 15,580 feet above sea level. Here the Lauicocha is born and its pure blue waters are rightly entitled to the distinction of being the ultimate source of the Amazon. Farther down the river, is Lake Lauicocha, which is designated on Peruvian maps as the head source of the Amazon, the fact being however, that the real source is nearly 100 miles to the southwest of this lake.

NITRATE RESOURCES OF CHILE. According to the *Mercurio* a leading newspaper of Santiago, Chile, there are 220 million tons of nitrate in government land that could be worked now. At the present rate of increase of the consumption it is calculated that this will last about sixty years; and taking into account the probable quantity of nitrate that remains still to be discovered, it is thought that there is a supply sufficient for at least 100 years.

DR. BRANNER GOING TO BRAZIL. Dr. J. C. Branner, Professor of Geology, at the Leland Stanford Jr. University, Cal., will start on April 15 with six assistants to explore the western part of the north coast of Brazil. The special object will be to determine how far the distribution of Brazilian fauna is affected by the obstruction of the Amazon River. The government of Brazil will provide the explorers with a gunboat.

AFRICA

CLIMATE AND RAINFALL OF SOUTH AFRICA. In the South African Supplement of the *London Times,* Nov. 5, 1910, Mr. R. T. A. Inness, Director of the Transvaal Observatory, has an excellent short paper on the climate and rainfall of South Africa. Over most of the territory about three-quarters of the rainfall comes in summer. On the other hand, there are notable exceptions. For example, over the Cape Peninsula and for some distance inland the chief rains occur in winter, and along a narrow strip of the southeast coast the rainfall is fairly equally distributed over the whole year. Immediately to the south of German Southwest Africa and some way north of the Cape Peninsula the country is practically rainless. At the principal towns of South Africa, where observations have been taken for the longest periods, the mean temperatures of the warmest month average between 68° and 77°; of the coldest month, between 47° and 65°; the absolute maxima range from 94° to 111°, and the absolute minima from 16° to 34°. The means for the year range between 59° and 72° at these same stations.

The High Veldt of the Transvaal and Orange Free State has an average summer rainfall of from 15 inches in the west to 25 inches in the east. The summer rainfall comes largely in the form of short, intense showers. In good

years the eastern half of the Union is visited by rains of a monsoonal type, and when these rains come over a succession of several years the water-level is raised, and lakes and "pans" are filled with water which will last throughout several dry seasons. There has recently been a dry period of some 20 years in this region, but the last two seasons' records seem to indicate a return to a wetter period. Thunderstorms and hail are very rare over the Cape Peninsula and district, but violent thunderstorms are frequent over the Transvaal and Orange Free State, where destructive hailstorms frequently do considerable damage.

The cloudiness is very small in amount, averaging but 31% over the Transvaal province. The soil dries quickly under the bright sunshine. During the day there is almost always a breeze, which dies down at sunset. The dry soil and the wind are together responsible for the dust, which is one of the disagreeable features of the climate. Snow is not uncommon in Basutoland and in parts of Cape Colony. At very rare intervals it falls in the Transvaal, as was the case in August, 1909, when 14 inches of snow fell in Johannesburg in 26 hours. R. DEC. WARD.

THE SUEZ CANAL. The commercial movement through the Suez Canal in 1910, was 22,434,661 tons, of which 8,429,041 tons were carried from the Mediterranean to the Red Sea, and 14,005,620 tons from the Red Sea to the Mediterranean. The total tonnage through the Canal in 1910 was 2,510,483 larger than in 1909.

ASIA

BIRD MIGRATIONS AND WEATHER. Dr. W. R. Eckhardt (*Das Wetter*, 1910, No. 10) has been investigating the meteorological conditions of bird migration in Europe, with some interesting results. He finds that the general direction of migration of the birds over central Europe in spring is towards the northeast, while southerly winds are usually blowing at the earth's surface. This results from the fact that a cyclone over the British Isles produces a southerly wind in Germany, while above the surface, in accordance with the law of change of direction of cyclonic winds with altitude, the direction gradually changes more and more towards the west. The birds make use of this upper current in order to carry them towards the northeast, where their breeding grounds are situated. The fact, noted by many observers, that migrating birds often fly "against" the wind, or obliquely to the wind, thus finds simple explanation: they are migrating with the upper currents, which are not the same as those on the surface.

Observations of the temperatures of the free air made at Hamburg and Aachen during March 18-19, 1909, at the time of maximum bird migration, showed that the birds must, at that time of the year, almost always fly in air strata whose temperatures are below the freezing point. Pressure distribution seems to be the most important meteorological factor controlling bird migration. According to Marek the advances of barometric maxima from the north toward central and southern Europe are to be considered as the causes of the beginnings of the autumn migrations, while the advances of the sub-tropical high pressure area from the Azores or from the southeast are followed by the migrations of spring. R. DEC. WARD.

POLAR

THE ZEPPELIN STUDY EXPEDITION TO SPITZBERGEN. The party led by Prince Henry of Prussia, which left Germany last season to make studies in Spitz-

bergen, that might help towards the practical participation of dirigible balloons in Polar exploration, returned safely home. Prof. E. von Drygalski, the commander of the German Antarctic Expedition on the *Gauss,* recently gave some facts concerning the work of the party at a meeting of the Berlin Geographical Society, (*Zeitschr.* of the Berlin Society, No. 10, 1910). Among other participants in the expedition were Count Zeppelin, Dr. Hergesell, the meteorologist, Prof. Reich, and other scientific men. The funds were provided chiefly by Privy Counselor Friedländer-Fuld, the North German Lloyd loaned the services of its steamer *Mainz* and Count Zeppelin, and the scientific staff planned the work. The Norwegian sealing vessel, *The Phoenix,* was engaged for ice navigation, and the yacht *Carmen* was taken along for in shore work. A captive balloon was part of the equipment.

Prof. von Drygalski says that one result of the trip is proof that the dirigible balloon can be brought down to the ice safely, and anchored quickly by an iron appliance, which was successfully tried with the Zeppelin balloon. It is believed the anchor would hold the balloon in the face of a severe windstorm, as it held fast in the ice, though heavy stress was brought to bear upon it, by means of the capstan of the *Mainz.*

Most of Prof. von Drygalski's paper is given to the general scientific work of the party, but he says he is free to declare that a number of fundamental facts and considerations of importance, in all attempts to use airships for exploration have been established.

The widely spread announcement that, encouraged by the success of these studies, a party will go to Spitzbergen and attempt in July next, to reach the North Pole by balloon, is evidently erroneous. Prof. von Drygalski announces that the entire party last year was convinced that no attempt for North Polar exploration should be permitted until the airship and especially its motor have become more safe and practical than they are now.

Mr. Leffingwell in Alaska. Mr. Ernest de K. Leffingwell, under date of Sept. 22, 1910, writes from his camp on Flaxman Island, having just returned from a three-weeks trip to the westward, in his yawl *Vega.* Though storm bound for several days, he was able to map the reef of islands as far as the Midways, twenty-seven in all, and fifteen miles of coast on the main land. Considerable difficulty was experienced, on the return, in crowding the vessel through the ice which was rapidly forming. At one point the boat grounded in shoal water, and the party had to wade and work in the ice water for half an hour to get off. The season had been very open. Two caribou were secured on the trip, besides a plentiful supply of walrus and seal meat for the dogs. Mr. Leffingwell's letter was brought by a party of Eskimos overland to Fort Yukon, where it was postmarked Jan. 16, 1911; it arrived in Pasadena, Cal., on Feb. 26. Letters are expected later by way of Herschel Island, by the dog sledge mail of the Northwest Royal Mounted Police.

The programme Mr. Leffingwell had in view at the close of the Mikkelsen-Leffingwell Expedition (*Bulletin,* 1907), included the exploration of the area north of the Yukon-Arctic divide, and between the Colville River, and the Canadian boundary. Four years (which have nearly drawn to a close) he estimated would be necessary for the accomplishment of his task. In the first two seasons Mr. Leffingwell's work included tidal observations for three months at Flaxman Island; the mapping of a portion of the coast and about 100 miles of traverse in the interior; observations for latitude, longitude, and azimuth;

geological observations, including collections of fossils, studies of the Eskimo vocabulary and grammar; and meteorological observations for a complete year. Mr. Leffingwell continued his survey of the coast between Herschel Island and Point Barrow. About fifty miles of the Canning River, opposite Flaxman Island were mapped and the geological work in that region was completed.

He now expects to survey the coast between the Colville River and Demarcation Point. Four longitudes were secured by occultation during the winter of 1909-10, in addition to the four previously worked out by the United States Coast and Geodetic Survey.

The explorer's address is Barrow, Alaska. He will go for his mail about Aug. 1, and two months should be allowed for letters to reach Barrow. Supplies are to be forwarded to Mr. Leffingwell, through the Pacific Net & Twine Co., Seattle, and packages reaching the Company by May 1, will be included in the cargo to Flaxman Island.

Lieut. Filchner's Plans. This explorer reported in January to his financial Committee, in charge of the finances of his coming enterprise that he expected to start for the Antarctic from Hamburg this Spring, on his ship the *Deutschland*. He will make oceanographical observations across the Atlantic to Buenos Aires and expects to leave that city in October for Sandwich Island, from which, late in December, he will start across Weddell Sea, expecting to make his headquarters perhaps on Coats Land, but preferably on some still unknown land further south.

His ship will return to the Atlantic to pursue oceanographical researches, leaving at the station ten men who will spend the winter in scientific studies. Upon the dawn of the summer of 1912, four men will start on a sledge journey across the unknown Antarctic area. It is hoped, during the winter, to establish supply câches for a considerable distance on the route. The sledges will be drawn by Manchurian ponies. The distance from Coats Land, south of the Atlantic, to Ross Sea, south of the Pacific, is over 1,800 miles and unless Filchner is favored with unusual conditions of travel, he cannot make the journey in a single summer. It is more probable that he will be compelled to winter in South Victoria Land, perhaps at quarters established by the British Expeditions. Eight specialists will constitute the scientific staff. This expedition hopes, as a part of its work, to ascertain if the land mass is of continental extent or whether it is, in fact, an archipelago.

Ice in Arctic Seas in 1910. The Annual published in Danish and English by the Danish Meteorological Institute, under the title "The State of the Ice in Arctic Seas," has appeared for 1910. As usual, it is prepared by Commander C. I. Hansen, who has collected the information from institutions, mariners, men of science and others, who were in touch with the Arctic last year.

Whalers in the Greenland Sea reached Lat. 80° N. as early as May, though at Angmagsalik, the Danish station about 15° further south, the ice lay close in shore all summer and it was not until September that the station was reached by a ship. The coasts of Iceland were almost ice-free. The conditions were very bad at Spitzbergen and navigation in Horn Sound and Bell Sound was very difficult. The winter ice in Barents Sea, north of Norway broke up early and it was reported that a vessel reached Franz Josef Land but soon had to retreat. The sea was open all winter along the southwestern coast of Novaya Zemlia. A great deal of ice from East Greenland rounded Cape Farewell and

blocked up the coast of Southwest Greenland as far north as Frederikshaab till the end of August. Hudson Strait and Bay were navigable in July, but the Bay did not become ice-free till August. Davis Strait and Baffin Bay were unusually free from ice. In April and May the ice limit in Bering Sea was farther south than usual. The conditions were normal in Beaufort Sea, to which our San Franciscan whalers resort, but were unfavorable along the coast of Northeast Siberia.

PHYSICAL GEOGRAPHY.

Comparison of North American and European Glacial Deposits. American students of glacial deposits, especially those working in the Mississippi Valley, have divided the drift sheets into three or four divisions, interpreted as glacial stages separated by inter-glacial stages. The latest glacial stage is the Wisconsin preceded by the Illinoian, Kansan, and Pre-Kansan (or Nebraskan or Jerseyan). Four stages are also recognized in north Germany, the youngest being the young drift or upper Diluvian, preceded by the middle drift, the old drift or Saxonian, and the Scanian. In the Alps, Penck and Brückner have recognized the Würm, preceded by the Riss, Mindel and Günz.

Various attempts have been made at correlation of these different glacial stages of the two continents; but the most elaborate, as well as the most recent, is that by Leverett (*Zeitschr. für Gletscherk.*, Band iv, 1910, pp. 241-295 and 321-342). He is himself one of the chief students of the subject of differentiation of glacial deposits in America, and he spent "the year 1908 in western Europe in a study, which had for its aim a comparison and tentative correlation of the glacial deposits there with those of the United States, on the study of which he had been engaged since 1886." In his European studies Leverett was freely aided by a large number of the leading students of Pleistocene glaciation. Leverett admits that in spite of his long preparation in America and of his year's investigation in Europe, with the aid of a large number of eminent glacialists, "it would be presumptuous for one to pretend to clear up the matter of world-wide correlations of glacial deposits in a single year's study. . . . The full correlation, however, may in time be reached by repeated efforts of this sort."

The main body of Leverett's article consists of a detailed statement of the characteristics of deposits in different sections of Europe and America, and a discussion of the resemblances and the differences; and from this standpoint the article is one of very great importance and value to all students of Pleistocene glaciation, for it brings together, in summary, some of the main characteristics of deposits over a wide area and some of the main results of a great body of workers. The article closes with a series of paragraphs of summary and conclusions. He considers that there is little question of the correlation of the Nebraskan or Pre-Kansan drift with the Günz of the Alpine region. The second glacial stage, the Kansan, seems to correlate with the Mindel drift of the Alps, and the lower Diluvian of the North German lowland. The third glacial stage, called Illinoian in America, apparently has nothing that correlates with it in Europe, for the middle drift of the North German lowland and the Riss drift of the Alpine region, though representing the third glacial stage in these regions, each seems to be younger than the Illinoian drift. The Würm, Upper Diluvian, and Wisconsin drift seem to correlate fairly well. There are differences in detail, rendering some parts of this correlation less definite than one would ex-

pect. For instance, the Riss drift is more weathered than the loess-covered moraines of the Wisconsin drift and is doubtful as a possible equivalent of those moraines. The Würm drift correlates well with the loess-free moraines of America.

In his concluding paragraph Leverett says: "Although the variations in climate that give rise to glacial and interglacial stages seem to have been world-wide in scope there are not such close correspondence in glaciation in either widely separated or in adjacent fields as one might expect to find. Perhaps the most remarkable of all the discordances is that of the time of maximum extent of the adjacent Labrador and Keewatin fields in America. Why one field should have had its greatest extent in the second glacial stage and the other in the third is not apparent. It constitutes one of the leading problems for American glacialists. The meteorological conditions of the Ice Age are as yet but little known. When they are cleared up much light may be shed upon what now seems to be glacial eccentricities. R. S. TARR.

ARCTIC TIDES. Dr. Rollin A. Harris, of the Coast and Geodetic Survey, has written a monograph ("Arctic Tides," 103 pp. and cotidal Map, Coast and Geodetic Survey, Washington, 1911) which brings together practically all available results pertaining to tides in Arctic waters. The work contains, in considerable detail, the remarkably accurate tidal observations along the northern coast of Grant Land and Greenland by the latest Peary Expedition as well as the observations at Flaxman Island and vicinity on the north coast of Alaska by the Mikkelsen and Leffingwell Expedition. The advantage of having all important tidal evidence in one publication is self-evident. In connection with the work, Dr. Harris has made numerous harmonic analyses and also expended much labor in unifying nonharmonic results from various sources. He says that, at the present time, observations are especially desired in the following regions or localities: the outer coast of Prince Patrick Island and Banks Land, the coasts of Mackenzie Province, the northwestern coast of Alaska, Wrangell Island and the Arctic coasts of Siberia.

Referring to Nansen's hypothesis that the unknown Polar region consists entirely of deep water, Dr. Harris considers that the decided westward drift observed by Mikkelsen and Leffingwell, off the northern coast of Alaska, is strong evidence against Nansen's faith in an unobstructed Polar Basin; and the westerly direction taken by the *Jeannette,* especially during the last five months of her drifting, does not suggest unobstructed deep water to the northward of East Siberia.

GLACIAL EROSION. In the last few years the writings in English upon the subject of glacial erosion have been mainly favoring the idea of extensive modification of topography by the erosive action of glaciers along lines of rapid movement. It is probably true that the great majority of glacialists are convinced that former, extensive glaciers have performed a vast amount of erosion. Not all, however, are convinced by the evidence, and among those who as yet remain unconvinced is Prof. E. J. Garwood, who, under the title of "Features of Alpine Scenery due to Glacial Protection," (*Geographical Journal,* Vol. 36, 1910, pp. 310-336) advances certain objections which he sees to the views of those who advocate extensive erosion, and puts forth a theory to account for phenomena that the majority of glacialists are assigning to glacial erosion. As the title indicates, his thesis is that ice is a protection rather than

an agent of destruction, and he applies his argument mainly to the Alps, with which he is intimately familiar, though drawing some illustrations from the Himalayas and Spitzbergen, which he has also studied.

The phenomenon of hanging valleys, considered proof of profound glacial erosion by the majority of glacialists, he assigns to the work of streams issuing from the front of a glacier and cutting out a gorge, which has later been enlarged, involving slight deepening and considerable broadening, by ice erosion during an advance of the glacier. With each recession of glacier ice during an interglacial period, gorge cutting proceeds below the glacier terminus while above it the ice in the valley is protecting the valley bottom from erosion; with each advance of the ice the interglacial gorge is broadened by glacial erosion. Garwood correlates with this set of conditions a series of steps present in certain glaciated valleys, interpreting these as indexes of the positions which the glacier front held during the interglacial times.

While the glacial erosionist will probably feel that the argument is incomplete, in the first place in assigning to interglacial gorge formation far too much work, and in the author's failing clearly to see the evidence of differential ice erosion in the valley steps which puzzle him, one cannot but be impressed by the serious attempt to understand a difficult problem and to meet objections to the current theory which have appealed to him. The fairness with which Professor Garwood has approached the problem is clearly indicated by the paragraph with which he concludes his article, which reads as follows:

"The foregoing account is an attempt to show how certain features in the Alps may have arisen on the assumption that ice erodes less rapidly than other denuding agents, and may consequently be protective. It is, of course, possible that under certain other conditions ice may erode more vigorously than water; if so, then the results would naturally be reversed. Can it be possible that we meet with both these conditions even in the same district, perhaps even in the same valley? Can it be that in the higher valleys and slopes, ice has exerted a relatively protective influence, while in the lower portions of the valleys where many large affluents coalesced in a single valley, glacial excavation has been more vigorous. If this should be so, it will explain the different interpretations which different observers have placed on the facts they have observed. Further detailed observation alone will show." R. S. TARR.

GENERAL.

FRENCH GEOGRAPHICAL CONGRESS. The 30th National Congress of the French Geographical Societies will open at Roubait on July 29, for a week. Prince Roland Bonaparte will be President. Special attention will be given to physical geography, anthropogeography, and to France and her colonies. Dr. Charles Droulers, President of the Commission of Organization, has sent a circular to foreign geographical societies inviting their members to prepare papers for the Congress. The latest date for the receipt of such communications is July 1 prox.

MAPS FOR AERONAUTS. The French have taken up the subject of preparing maps for the use of aeronauts. A sub-committee of the "Permanent Committee" on aerial navigation has been appointed to study the air ship maps in use, the various projects for their improvement and to evolve an experimental map.

Germany has been inviting attention to this subject for about two years. It was a feature of the German Geographical Congress at Lübeck in June, 1909. It was discussed by geographers, cartographers and aeronauts at the Berlin Airship Conference in November of that year and the Map Commission of the German Airship Union has been studying the question of the cartographic needs of aeronauts and how best to meet them. *Petermanns Mitteilungen* and other periodicals have published a number of experimental maps.

Some conclusions seem to have been reached as to essential features of an airship map. The topographical sheets of the European countries are regarded as an adequate basis upon which to impose or emphasize the information required. It is generally thought that the map scale should be three miles to an inch. Churches, steeples, castles, towers and other landmarks should be made especially conspicuous as also, rivers, railroads and settlements. Figures of the elevation of the highest points should be marked in red figures. Conspicuous colors should be used as warnings, showing, for example the position of telegraph lines and other impediments to landing. The location of repair shops and other special information needed by the navigator must be given graphically so that their meaning may easily and quickly be grasped.

OBITUARY.

Dr. Alexandre Schenk. Dr. Schenk, professor of anthropology at the University of Lausanne, Switzerland, is dead at the age of 36 years. The *Bulletin* de la Soc. Neuchateloise de Géogr., for 1909-1910, contains the third part of Dr. Schenk's "Étude sur l'Anthropologie de la Suisse," the first two parts having appeared in the two preceding volumes. At the time of his death the fourth and concluding part of the work was in preparation.

GEOGRAPHICAL LITERATURE AND MAPS

(INCLUDING ACCESSIONS TO THE LIBRARY)

BOOK REVIEWS AND NOTICES

AFRICA

African Game Trails. An Account of the African Wanderings of an American Hunter-Naturalist. By Theodore Roosevelt. xv and 529 pp., map, illustrations, 5 appendices and index. Charles Scribner's Sons, New York, 1910. $4.

Colonel Roosevelt's book, even if he had enjoyed only the ordinary opportunities of the Nimrod to hear, see and collect information, would easily stand in the forefront of books of its class. But exceptional opportunities of all kinds were his, and he utilized them fully to fill his pages with good, profitable reading. These advantages coupled with the literary quality of his pages has resulted in one of the great works of its kind. He has also given the best account of the fauna of Tropical Africa that has appeared in a work for popular perusal. He had the advantage, furthermore, of ample scientific assistance in the field, so that his museum collections are very large and his appendices, giving lists of the fauna collected, including descriptions of the habitat of many species, and an account of the biological survey of Mt. Kenia, are very desirable additions to African literature. In Appendix E, Col. Roosevelt presents many facts that tend to discredit the theory of protective colorization. The author, as well as many other travellers, has faith in the future of British East Africa. He writes (p. 373):

"The highlands of East Africa form a white man's country, and the prime need is to build up a large, healthy population of true white settlers, white homemakers, who shall take the land as an inheritance for their children's children. Uganda can never be this kind of white man's country; and although planters and merchants of the right type can undoubtedly do well there—to the advantage of the country as well as of themselves—it must remain essentially a black man's country, and the chief task of the officials of the intrusive and masterful race must be to bring forward the natives, to train them, and above all to help them train themselves, so that they may advance in industry, in learning, in morality, in capacity for self-government."

The Union of South Africa. By The Hon. R. H. Brand, Secretary to the Transvaal Delegates at the South African National Convention. 192 pp., including in the Appendix The South African Act of 1909. Clarendon Press, 1909.

The birth of a new State can never fail to be an event of interest. For some years we have had our attention especially directed to the social, political and economic affairs of South Africa. We were all more or less interested in reading the stories of the trekking Boers and the aggressive English, which stories concluded with the inevitable British victory. But the war ended, what

next? The Hon. R. H. Brand, who has been familiar with the situation for some years, holding position in the public service of the Transvaal and Orange River Colony, as he tells us, and serving as secretary to the Transvaal delegates at the South African National Convention which shaped the constitution of the New South African Union, would appear to be a person likely to be well informed; one who could write with something like authority on "The Union of South Africa." He concludes the preface to his book however, by stating that the opinions expressed are purely personal. We are reminded of our own early constitutional convention when he tells us that this "convention sat with closed doors, and secrecy is still maintained as to its proceedings."

For the student of political institutions, in particular of constitutional conventions, the book is certain to be considered one of striking interest. The author has very successfully shown how marvelous has been the adjustment and assimilation of interests in South Africa since the Boer war. South African politics, "always kaleidoscopic," as he says, have never presented so astonishing a picture as that which makes up the subject matter of his book. In an "Historical" chapter the author calls attention to the attempts made to form a union prior to the one of which he writes, and to the difficulties which have stood in the way, chiefly economic, added to which is what he terms "the native question." The composition of the convention as to membership is explained, and the most important questions which came up for consideration in the same are noted.

In the adjustment of details, it is an interesting fact that Pretoria is fixed as the seat of government, that is, of the executive, and Cape Town as the seat of the Legislature, and the advantages and disadvantages of the plan receive consideration by the author. The questions of the executive, legislative, and judiciary department of provincial constitutions, of the relation of the mixed racial conditions to the new government, of future policies, and of the relation of South Africa to the Empire, are all interestingly presented.

E. L. Stevenson.

Arts and Crafts of Ancient Egypt. By W. M. Flinders Petrie. xvi and 158 pp., 140 illustrations. A. C. McClurg & Co., Chicago, 1910. $1.75.

A work on Egyptology by Prof. Petrie, needs no endorsement. His present hand-book was written to aid in the understanding of Egyptian art, and the treatment keeps that purpose steadily in view; so that the book is different from others in which Prof. Petrie has given the history of Egyptian art or the origins and connections of the art in each age. The work will be very valuable to those who wish to know better what Egyptian art is and to give it intelligent appreciation.

Die Fischerei an der Westküste Süd-Afrikas. Bericht über Untersuchungen an der Deutsch-S-W-Afrikanischen Küste und am Kap der Guten Hoffnung. 57 pp., 9 illustrations, and maps. Verlag von Otto Salle, Berlin, 1907.

Gives detailed results of study of the fisheries and guano fields along the coast of German Southwest Africa; the extent of the fisheries, mainland districts best adapted for centers of the fishing industry, climatic conditions, preparation of the fish for market and organization of fisheries interests. The plates show a number of the leading commercial fish.

ASIA

L'Inde. Sa Condition actuelle. A propos du Cinquantenaire de son incorporation au domaine de la Couronne britannique. Par Édouard Clavery. vii and 107 pp. Berger-Levrault & Cie., Paris, 1910.

The author describes concisely the present material condition of India, the distribution of its population among important occupations, the extent of mineral production, the facilities for transportation, the educational system and its results, the agricultural output, and the commercial relations with other countries. A list of important Hindoo terms and a bibliography conclude the work. The writer is in sympathy with the work of the United Kingdom in the Peninsula and regards it as conferring lasting benefits upon the people.

L'Inde Britannique. Société indigène—Politique indigène: les Idées directrices. Par Joseph Chailley. xvi and 513 pp. and index. Large 8vo. Armand Colin, Paris, 1910. Fr. 10.

This study of India is devoted especially to her social, political and administrative problems. The great difficulty in discussing these problems lies in the composite character of her population which, though sometimes wrongly taken for a nation, has never been one and consists, to this day, of about 43 different races and nationalities, with 147 different languages and idioms. The religious divisions, although not so numerous, add to the complexity of the situation, and as the different creeds in India mean, not only religious, but also social, organizations, it is as difficult to pronounce opinions on India as a whole as it is to propose any universal solution of her problems.

The most tangible expression, and at the same time the most successful ally, of this national segregation, is the caste system. The author denounces it as the most powerful obstacle to progress along any line whatever. Missionaries and secular reformers alike would find their work half done if this system only were removed. As in the days of old, it is to a large degree the lower classes who accept the new faith that places them in a more dignified position with regard to the deity as well as their fellowmen; hence converts of the upper classes irremediably lose caste by the contact, and association with them in the missions. In the mission schools every pupil endowed with the necessary intelligence receives the same instruction regardless of caste distinctions, and therefore the Christian element represents, to a certain extent, the intellectual élite of the country. But owing to the low social standing of the majority of the pupils, the actual influence of the graduates, though all of them advocates of reform and progress, is even smaller than the, already, small percentage of the population which they represent. In Madras, for example, the Christians are 2.7 per cent. of the total population, while among those who attend school, 6 per cent. of the men and 26.5 per cent. of the women pupils are Christians. Among the high caste Christians the position of the women is especially deplorable. Separated from the rest of their race by their different convictions, and from those who share their convictions by their different race, their isolation is equal only to that of the educated negro between the two races in the United States. For the caste, not India, is the real fatherland of the Hindoo. A person not belonging to any caste is not a respectable person. To be Hindoo, means to belong to a caste, and "Out-Castes" there are none because those not belonging to any particular caste will, by this very characteristic, be a caste by

themselves, though it be the lowest of all. Though often denounced and attacked, the system stands unshaken to-day as it was generations ago; on the contrary, new castes are continually forming wherever a group of people wish to give themselves special distinction, and the adversaries of the system are obliged, one after the other, to declare themselves defeated. The only class that might really do something in the matter, the native princes, stand by in perfect indifference.

Yet the institution is not so very old. The author proves its origin to be younger than the Vedas because no mention is made of it in them. It seems to have been introduced after the Aryan conquest, perhaps in imitation of the Persian social scale of priests. Warriors, farmers, and artisans, subsequent to a conflict between the priests and warriors of India in the course of which the priests, being victorious, saw the advantages of a privileged social position like that of their Persian colleagues, and introduced a similar gradation of the different professions in their own country, with themselves, of course, at the head of the list. Their example, in its turn, influenced the other classes to organize in a similar way, until every profession had drawn a Chinese wall around all those belonging to it. In other cases, the question of blood must have a share in the process. Aryan blood, being that of the conquerors, was considered a mark of distinction and in order to preserve its purity intermarriage with the native population was forbidden. In the north, where the main body of the Aryans had settled, the precept was easy to follow; but in the south, which was subjected by conquering expeditions from the north made up almost exclusively of men, its enforcement was, at first at least, impossible, and the Aryan men had to take Dravidian wives in order to preserve the race at all. But as soon as the permanency of the race was secured, the principle of seclusion was again put in force, and the line was strictly drawn between those who, while not full blood Aryans, had at least some Aryan blood in their veins, and those who had not. The respective amount of importance given to the question of blood in the north and south speaks in favor of this theory; for in the north, it is made less of than in the south: e. g. where purity of blood is a matter of course, it loses some of its value as a distinction; where it is less frequent, it is correspondingly more valued.

In the educational and administrative problems, too, race, caste, and religion combine to make the path of the reformer anything but smooth. To conduct public schools, for instance, is next to impossible in such a caste-ridden country; for, however non-sectarian and non-political, the school cannot be non-caste; it may ignore caste differences, but that will not secure it against caste influences, and it will only be the children of the liberal minority who attend it. The foreign character of the higher grades of teaching adds to the difficulties of the situation. The adoption of a sound administrative policy encounters other difficulties in its turn through the racial jealousies especially of the Hindoos and the Mohammedans. Of these two groups, the former constitute the pensive and scholarly, the latter, the active and statesmanly element. Owing to the introduction of the civil service system, for whose examinations the Hindoos are, of course, the better gifted party, the latter hold a number of important positions which is not only disproportionate to their number, but also to their administrative talents. While the Mohammedans, who are the better leaders, have comparatively few chances for leadership owing to their aversion to tests by competitive examinations.

While the book is, in the first place, a political and sociological study, it is incidentally also of great interest to the geographer through these manifold ways in which ethnological conditions are shown to influence the march of affairs. For this reason it may almost be called a geography of man in India, and it ought to be found by many a valuable supplement to the current books of a more strictly geographical character on that interesting country.

MARTHA K. GENTHE.

Tramps in Dark Mongolia. By John Hedley, F.R.G.S. xii and 348 pp., illustrations and map. T. Fisher Unwin, London, 1910. 12s. 6d.

The wanderings of Mr. Hedley, were really within the confines of China proper, as they were in the northeast of the Pechili Province, north of the Great Wall and of the railroad from Tien-tsin to Kin-tshou. Most of the region, however, is quite inaccessible and almost unknown and he has given an interesting account of this great district which is blessed with rich resources and destined some day to be important. Mr. Hedley is a missionary who in his trips was able to converse with all classes of people in their own language and thus he secured a great variety of information concerning their mode of living and general customs, which are believed to be now about what they were a thousand years before the Christian era. Studying both Christians and Mongols on the borderland where the two races meet he found that their Government is very bad, that the authorities at Peking give little attention to their well-being and that brigands and oppression are wide-spread. He believes that in the course of the development of minerals and railroads, prosperity will come to this outlying part of China, which has great possibilities of growth and enrichment. One of the advantages of the book is that this earnest missionary is well informed as to the history of the country and its people, so that he tells us what has happened at various places and correlates the landscape with the events that once influenced half the world. The book fills most adequately a gap in our acquaintance with China.

Tent Life in Siberia. Adventures among the Koraks and other tribes in Kamchatka and Northern Asia. By George Kennan. xix and 482 pp., 32 illustrations and maps. G. P. Putnam's Sons, New York, 1910. $2.50.

This is the book that made Mr. Kennan well known in 1870, when it was published. In the forty years since then the book has never been out of print, nor ceased to find readers. This long demand has encouraged the author to issue a revised, illustrated and much enlarged edition. The present volume contains over 15,000 words of new matter, including the incidents and adventures of a winter journey overland from the Okhotsk Sea to the Volga River, a sleigh ride of more than 5,000 miles. A large number of the views are from photographs taken by recent explorers.

Studies in Galilee. By Ernest W. Gurney Masterman. With a preface by George Adam Smith. xv and 154 pp., maps and 32 illustrations. University of Chicago Press, Chicago, 1909. $1.

Dr. Masterman is familiar with Galilee, has labored for sixteen years or so in the East and his papers on the history and geography of the Holy Land are regarded as authoritative. Few scholars have his knowledge of the recent history of Palestine and of the life of its people. Geographers will be interested to know that in these pages they will find a lucid account of the Galilee of to-

day, of the character of its inhabitants, of the industries in which they are engaged and of the position in history that the country occupies. His work also includes discussions of disputed opinions as to the position of localities or objects mentioned in ancient history and descriptions of many of the ancient ruins.

Across Yunnan. A Journey of Surprises, including an Account of the Remarkable French Railway Line now completed to Yunnan-fu. By Archibald Little. 164 p., map and 16 illustrations. Sampson Low, Marston & Co., Ltd., London, 1910. 3s. 6d.

Yunnan, until recently the least-known part of China proper, is coming more and more into notice. We have now two good books in English on this western province. Major Davies published an exceptional work on Yunnan (*Bull.* 1909, p. 651), which was the record of four journeys in the province to ascertain the feasibility of constructing a railroad between India and the Yangtse river. The present work was originally written by Mr. Little as letters to the *North China Herald.* This traveller and author died before his letters were prepared for publication and his book has been edited by his wife. Mr. Little was well known for his long travels in China and his vivid and painstaking descriptions of what he saw and heard. His last book contains the first extended description written in English of Yunnan from the Tonkin border to the Yangtse river; also much information about the French railroad from Hanoi to Yunnan-fu opened last year.

AUSTRALASIA AND POLYNESIA

Hawaii and its Volcanoes. By Charles H. Hitchcock, LL.D. viii and 314 pp., 68 plates, including maps, and index. Large 8vo. The Hawaiian Gazette Company, Honolulu, 1909. $2.

The object of this book is "to describe correctly the phenomena connected with the discharges of molten lava from the two great Hawaiian volcanoes." For this purpose the author has collected and published (—or re-published, as the case may be—) the records of the known visits to those volcanoes from the early explorers to modern tourists. These records constitute 206 out of 289 text pages of the book. They are preceded by a chapter on the physiography of the Hawaiian archipelago, and followed by another on the Hawaiian type of volcanic action; an appendix of 15 more pages forms the conclusion.

It may be questioned whether it was necessary to devote such a large part of the book to the collection of all that testimony, most of which has been published before in scientific and other magazines. In this, their original form, they have an actual interest only for the scientist, as raw material for the study of vulcanism; to him however, they have, with few exceptions, long been accessible, and he would care less for a chance to possess them in book form than for the conclusions Mr. Hitchcock derives from them. The lay reader, on the other hand, can hardly be expected to have that scholarly interest in the matter that will enable him to read over again and again descriptions of pretty much the same story with all their unavoidable repetition, and will, in his turn, skip the larger part of this matter in order to get to the Professor's opinions on it. With a few exceptions, therefore, among which the diary of the botanist of Vancouver's expedition, Archibald Menzies, deserves especial mention, this, by far the largest, part of the book seems a rather superfluous ballast which only serves to make the book more bulky and, consequently, more expensive.

When one buys a book on Hawaii by a noted scientist it is the observations

and opinions of the author that he wants to obtain, not those of several dozen of miscellaneous and, to him, unknown observers. In its present shape, the book ought to have another title; but it might be preferable, after all, to omit most of parts 2 and 3, and let the book be true to its name: "Hawaii and its Volcanoes, by Prof. Hitchcock." As things are, the author's part of the work is limited to parts 1, 4, and the appendix, which is a little less than one-third of the whole book. Physiographically he distinguishes two classes of islands in the archipelago; the Low and the High, and the latter he subdivides into the "Lowest (e. g. uninhabited) of the High Islands," or those that do not rise more than 1,000 ft. above sea level, and the "High Inhabited Islands," or those above 1,000 ft. high. They all seem to rest on a submarine foundation of tertiary limestone which is traversed by eruptives.

Those called low are either swept by the waves in time of storms, or are simply reefs or shoals. They are partly sandy, partly shrubby; among them Laysan Island is noted for its birds and guano. The same is true of Nihoa, among the Lowest of the High Islands. Among the High Islands, Niihau is one great sheep ranch which has, during the last forty years, been in possession of one white family; and it is worthy of note that, in spite of the absence of any oppression of the, originally, 1,000 natives of the island, they have dwindled away under the contact of Eastern civilization just like their cousins on the continents, until there are now less than 200 of them left. Kauai is renowned for its good soil which has made it the "Garden Island" of the archipelago. It seems to be the oldest of the islands because its flora is the richest and most individual in species of any on the islands, and it is also celebrated for its agate shells of which there are over 200 species with 800 or 1,000 varieties, each of which is confined to a small section of territory, so that the most widely divergent forms are found in the valleys most distant from each other. Oahu and Maui are doublet islands formed each by two volcanoes whose districts have been connected by more recent necks; and Hawaii is, likewise, the product of her five volcanoes, of which two are still active. It is on these that the author establishes the Hawaiian type of vulcanism as characterized by a caldera, basalt, the most easily fused of all volcanic rocks, the development of an ascensive column from whose summit lakes of molten lava accumulate and flow away intermittently, a sympathetic uprising in adjacent calderas, the building up of domes rather than cones from material forced up from below by subterranean power, magnificent fountains of fire, and usually by rather quiet eruptions and few earthquakes, (p. 286). This definition is, however, not based solely upon the contents of this book, as descriptions of the "Hawaiian type" which agree almost literally with this have found their way already into foreign textbooks of geology.

In the last chapter the author touches upon the similarities of the Hawaiian and Lunar volcanoes, as demonstrated by Prof. Pickering, but without getting beyond the statement that "it is not practicable to set forth farther the similarities between the Lunar and Hawaiian volcanic features.

MARTHA K. GENTHE.

The Official Guide of Western Australia. 256 pp., and many illustrations. Second Edition. E. S. Wigg & Son, Perth, Dec., 1909.

A folio containing historical, geographical and economic information about Western Australia, copiously illustrated, and with many advertisements bound in with the text. Useful to those who contemplate settling in the State and for general reference.

Forschungsreise S.M.S. Planet, 1906-7: I. Band, Reisebeschreibung. xviii and 104 pp., ills., and map; II. Band, Aerologie. 124 pp., and 3 maps. III. Band, Ozeanographie. Von Dr. W. Brennecke. vii and 153 pp. With separate volume of diagrams, charts and photo-engravings; IV. Band, Biologie; Von Dr. Gräf. v and 198 pp., ills., and map; V. Band, Anthropologie und Ethnographie. Beobachtungen und Studien. Von Prof. Dr. A. Krämer. x and 152 pp. and ills. Anhang: Noten zu den phonographischen Melodien aus Madagaskar und Indonesien. Herausgegeben vom Reichs-Marine-Amt. Verlag von Karl Siegismund, Berlin, 1909.

The official account of the results of the first two years (1906-1907) of the German exploring ship *Planet,* in the Atlantic, Indian and Pacific Oceans. The work of this government vessel is still in progress. These volumes are not only the record of scientific studies in the fields of meteorology, oceanography, biology, and anthropology, but also give details of the processes of investigation and discussions relating to the instruments used. The volumes are rich in material for the study of specialists in these branches of science. Many tables accompany the descriptive details.

EUROPE

Die Oberflächengestaltung des norddeutschen Flachlandes. Auf geologischer Grundlage dargestellt von Prof. Dr. Felix Wahnschaffe. Dritte, neu bearbeitete und vermehrte Auflage. viii and 405 pp., 24 plates including maps, 39 text illustrations and index. 8vo. J. Engelhorn, Stuttgart, 1909. M. 10.

From a modest little volume in the series "Forschungen zur deutschen Landes-und Volkskunde" this study of the surface forms of Northern Germany has grown to a book of the respectable size of almost 400 pages. Such an increase means, of course, besides the regular bringing-up-to-date of the text, a complete change in the character of the book which, from one among many others, is now considered more or less "the" book on the subject. In its present form it is, indeed, not only a study of special (very special!) German geology, but owing to the pre-eminently glacial origin of the surface forms of the country, it is at the same time a treatise on the most important problems of glaciation, as illustrated in the surface forms of northern Germany, and for this reason it has a more than local importance and will be found a comprehensive and trustworthy reference on these phenomena also by the geologist who is not especially interested in German local geology.

The author discusses, first the relation between the bedrock and the present surface forms; secondly, the influence of glacial and, thirdly, that of postglacial, processes on the same. It appears that the influence of the older formations on the surface forms has been much overestimated. The latter reflect only the most general features of the structure of the former while the surface detail is, as a rule, quite independent of them. The palæozoic and mesozoic rocks, heavily dislocated at various times and further reduced by the effects of erosion and denudation, rarely rise, island-like, out of the younger sediments, and while they often form the foundation of small isolated hills, have nothing to do with the general topography of the country.

Glaciation alone can be made responsible for the latter, which is determined both by the deposit of moraine material and the hollowing out of basins and

troughs, and, during the retreat of the ice, the formation of the great quaternary river and valley systems. It is their deposits that have brought the country into undeserved disrepute because, being almost level, these old river beds determined the layout of the railroads which, therefore avoid almost all the picturesque parts of the country and give the traveller the impression that northern Germany is one continuous waste of sand.

The surface forms which were left after the retreat of the ice and the great rivers were not much modified in postglacial times because erosion and weathering have not yet been long enough at work. The only changes which have influenced the landscape since are the filling in of depressions left by the ice and the upbuilding, or destruction, of the coasts. M. K. GENTHE.

A Concise Dictionary of Old Icelandic. By Geir T. Zoëga. v and 551 pp. Clarendon Press, Oxford, 1910.

The author is known for his English-Icelandic and Icelandic-English Dictionary. He prepared this work in the belief that Icelandic may be studied with advantage by English-speaking peoples, because it supplies a linguistic basis for the study of the Scandinavian influence that "was the earliest and one of the strongest of those outward forces which have gone to the making of modern English"; also because Icelandic is the source of much of the information necessary for the understanding of the early period of British history.

CARTOGRAPHY

Maps and Map-Making. Three lectures delivered under the auspices of the Royal Geographical Society. By E. A. Reeves, F.R.A.S., etc. xiii and 145 pp., maps, illustrations and diagrams. The Royal Geographical Society, London, 1910.

Mr. Reeves' little book makes extremely good reading. Any map user who opens it will be sure to turn the page. It is not a treatise. It will not teach the beginner how to do it. Being lectures before the world's most distinguished body of geographic amateurs, it sets forth and admirably illustrates the interesting things in the history of instruments and maps. There is no attempt at completeness either of history or theory; rather a general notion is built up of how map making is done and how the methods have grown. There has been success in this, for the book as a whole is amazingly clear. Only elementary considerations are entered into, of course, but a superficial knowledge of some measuring instruments is assumed. Rarely, an obscure explanation is offered, as that of the polar flattening evidenced by the fact that the number of miles in a degree is greater toward the poles, "inasmuch as the vertical lines, or radii of the arcs subtending the same angle, increase in length," p. 66. Nor can one well assent to the following:—"Even now longitude is much more troublesome to find than latitude, for the reason that there is no natural zero line from which it can be measured," p. 71. Surely longitude would be quite as troublesome to determine if the earth had been created with a natural zero of longitude plainly marked upon it.

Mr. Reeves' examples of modern maps and methods are exclusively British. Surely the best German map-work deserved an example and such beautiful work with contours as Mr. Matthes' Yosemite sheet should have been reproduced. Further there should be mention of the use of colors symbolically, as

on the maps of the United States Geological Survey; blue for water, brown for relief and black for culture.

Most interesting is the geographic gossip: how hard John Harrison found it (p. 43) to get the prize for his successful chronometer till the king took a hand; how it was Newton who really designed the first reflecting instrument (p. 18); how the five mile base on Hounslow Heath was measured with wooden rods in 1783 and again in 1791 with steel tapes, the results agreeing within three inches; that the concept of a spherical earth was probably Chaldaean or Egyptian.

One sees that Mr. Reeves has made ingenious modifications of a number of survey instruments. His man's head drawn upon the world net of various projections to illustrate the distortion due to each is a useful idea. The book is not suited for instruction but geography teachers will find it enjoyable and of use.

MARK JEFFERSON.

POLAR

The North Pole. Its Discovery in 1909. Under the Auspices of the Peary Arctic Club. By Robert E. Peary. With an Introduction by Theodore Roosevelt, and a Foreword by Gilbert H. Grosvenor. xxxii and 373 pp., map, illustrations, appendices and index. Frederick A. Stokes Co., New York, 1910. $4.80.

The best book Peary has written and in some respects the best that has been published on the Arctic. Not a small part of the volume is a compact expression of the quintessence of a quarter of a century's experience—the outcome of many years of study, planning, experiment and toil. No one could have written the book if he had lacked Peary's preparation for it. The work is therefore unique, both as a contribution to Arctic literature and also as the history of the first conquest of the North Pole by the man who made it.

The volume is worth the closest study of every man outfitting for Polar exploration. It would be foolish for any one to attempt to sail the Smith Sound channels without knowing all that Peary has written here about this long and dangerous stretch of navigation. Peary knew every foot of the Ellesmere Land and Grant Land coasts, all the indentations, the possible shelter for ships, every place where icebergs usually ground and the regions where the tide runs strongest. The reading of many of these pages brings the constantly recurring thought that a large part of Peary's active life was a preparation for the writing of the book.

The explorer says that the meeting place of the tides coming from Baffin Bay on the south, and from Lincoln Sea on the north, is in the neighborhood of Cape Frazer. This Cape, by the way, well-known in Smith Sound annals, does not appear on the map that illustrates the explorer's narrative. The map seems to have been prepared without Peary's supervision. The only new detail it could give were the explorer's routes, from Cape Columbia to and from the Pole and his soundings on the way; but the soundings are not shown and the return route from the Pole is not correctly laid down, for the map shows it as diverging all the way from the northern sledge track, with which it was, however, practically identical.

On his great sledge journey to the Pole, Peary did not use sleeping bags and in fact he has never used them since his first journey over the inland ice to the northern coast of Greenland in 1891-92, when he established the fact that Greenland is the largest island in the world. His party slept on the floor of

their tents or snow huts, with a musk-ox skin under and a light deer-skin over them. The changes he made in his equipment, his use of sheep-skin clothing, (p. 131), the new type of sledge he evolved, (p. 135), his dog harness made like those of the Eskimo but of different material, (p. 136), the preliminary training of the men for the arduous tramp, (pp. 134-138) and his ingenious and original plan for the employment of pioneer relay parties, a scheme that worked perfectly and was very important in his final success, are absorbing reading and full of helpfulness to all future ice explorers.

The work has a good index, the illustrations are admirable and the publishers have done their part in making the volume a satisfying memorial of one of the great achievements of polar enterprise.

GENERAL

Geographische Forschungsreisen und ihre Ziele. Von Dr. B. Bruhns. Mit 19 Abbildungen, 55 p. Karia-Verlag Abt.: *Natur u. Kultur*, Munich, 1910.

Dr. Bruhns mentions Shackleton, Hedin, and Peary as illustrating the leading types of explorers. He classes Shackleton's work as scientific and that of Hedin as resulting in much new information, but, being the work of one man, in forced marches over a great area, not so closely studied as to have the highest value. In Peary's work, the expedition to the Pole, he sees a very strenuous effort to reach the goal without great geographical results, as earlier enterprise had practically determined that the Pole is in the midst of the sea area. The exploration of the future, he believes, will consist chiefly of parties made up of experts in the various branches of geographic knowledge, the sum total of whose results will enrich geographical science. He especially mentions Hans Meyer and his studies in vulcanism and glaciology; Shackleton, the Sarasins in their studies of the most primitive human beings, as the Wedda and Sakai, and the Duke of Mecklenburg in his African work, as conspicuously illustrating the type of explorers needed for future field work.

Geologische Charakterbilder. Herausgegeben von Dr. H. Stille. 2 Heft. Grosse erratische Blöcke im norddeutschen Flachlande. Von F. Wahnschaffe. Tafeln 1–6. M. 3.60. 3 Heft. Das Karstphänomen. Von A. Grund. Tafeln 1–6. M. 4.80. Verlag von Gebrüder Borntraeger. Berlin, 1910.

This series of Charakterbilder uses reproductions of very carefully selected photographs to illustrate the structure of mountains, typical development of geological formations, the morphology of the earth's crust and other geological phases. Each number is complete in itself and may be purchased separately. The plates in Heft 2 finely represent some of the great erratics that are distributed over Northern Germany. Heft 3 has eight illustrations of typical Karst phenomena in Austria, Bosnia and Herzegovina. Each plate is accompanied by descriptive text and in each number is a short paper on the general topic illustrated.

O 2° Visconde de Santarem e os seus Atlas Geographicos. Por Jordao A. De Freitas, Official da Real Bibliotheca d'Ajuda. (Estudo publicado pelo actual Visconde de Santarem.) 182 pp., 1 plate and appendix. Officina Typographica, Lisboa, 1909.

The work contains a biographical sketch of the second Viscount de Santarem,

a description of his historical activities and a detailed account of the beginnings, progress and completion of his great Atlas, which involved long and enormous labor; also of his great collection of maps of the world and hydrographic and historical maps, which practically form a record of the history of cartography and of geographical progress during the Middle Ages. Complete lists of the maps used by the Viscount in his Atlas are found in the appendices.

Ratgeber für die Ausrüstung von Reisenden nach Übersee u. Tropen. Praktische Ratschläge für forschungsreisende Expeditionen, Auswanderer, nebst ausführlichem Verzeichnis von Büchern und Karten. Von Ch. F. Harford. Deutsche Ausgabe bearbeitet von Dr. F. Paech und J. Steiner. 148 pp. Dietrich Reimer (Ernst Vohsen), Berlin, 1910. M. 1.

A translation of Mr. Harford's work in English. The book (of convenient size for the pocket) is one of the best helps yet prepared in small compass, in its suggestions as to the essentials of outfit for tropical exploration. These concise suggestions fill only the first 64 pages of the book. The remainder is given to comprehensive lists of literature and maps relating not only to the German Colonies, but also to other parts of the world in which the field of exploration is still inviting. These lists are well worth adding to every geographical library.

Ibn G'ubayr. Viaggio in Ispagna, Sicilia, Siria, Palestina, Mesopotamia, Arabia, Egitto, Compiuto Nel Secolo xii. Prima Traduzione, Fatta Sull'Originale Arabo. Da Celestino Schiaparelli. 412 pp. and Index. Casa Editrice Italiana, Rome, 1906. L. 10.

Prof. Schiaparelli has rendered distinct service by this translation of the travel book of Ibn G'ubayr, renowned in Arabic literature. He made three journeys to Mecca. The "Rihlat" (Journey), now translated, contains his long account of his first journey from Feb. 4, 1183, to April 25, 1185, during which he visited all the countries mentioned in the above title. The narrative stimulated many similar pilgrimages by Arab travellers, which resulted in large additions to geographical knowledge. The volume contains interesting and unique descriptions of regions, cities and routes, as Ibn G'ubayr found them in the Twelfth Century.

Kunst- und Völkerentwicklung. Herausgegeben von Prof. Dr. Gustaf Kossina. 1 Heft. Spiral—Mäander—Keramik und Gefässmalerei Hellenen und Thraker. Darstellungen über früh und vorgeschichtliche Kultur-, Kunst- und Völkerentwicklung. Von Dr. Georg Wilke. Mit 99 Textabbildungen und 1 Tafel. 80 pp. Curt Kabitzsch (A. Stubers Verlag), Würzburg, 1910. M. 4.50.

Treats of the origin of the forms of ancient ornamentation, which it describes and illustrates, as applied to potteries, etc.

A Vagabond Journey Around the World. A Narrative of Personal Experience. By Harry A. Franck. xxii and 483 pp. and illustrations. The New York Century Co., New York, 1910. $3.50.

One of the most unique of travel books. It is the story of a young university man who made a journey around the world absolutely without money except the little he earned on the way. He travelled much in the steerage, lived

in the slums, discovered a new kind of tramp in France who evades the laws against vagrancy by peddling thread and needles, and found shelter in barns when landlords refused to let him camp on the office floor. He was an object of charity at Port Said, found unpleasant experiences almost everywhere and was turned hungry from a Catholic retreat in Palestine because his views on religious matters were not acceptable.

But there were also many bright features of his long travels and, on the whole, he enjoyed his varied experiences, was happy when the sun shone and bore rebuffs and misfortune with good humor. His book is differentiated from most other travel books by the fact that it is replete with information concerning the poor of every land and the humblest ways of life in every country. It is full of incident and is continually lightened with humor. Mr. Franck has told exactly how a man may girdle the globe without money, weapons or baggage—but not one man in a million would care to emulate his example.

La Conquête minérale. Par L. de Launay. 389 pp. 8vo. Ernest F. Flammarion, Paris, 1908. Fr. 3.50.

The study of mineral resources, in the widest meaning of the word "study," is the object of this work. It tells us what part mineral resources have played, in the past and present, in the industrial, economic, social, and political life of the nations, in the movements and conflicts of the races, in the settlement of countries and continents, and it also describes the technical sides of their exploitation. Partly scientific and partly philosophical, it is always thorough, without ever being dry, always interesting, without ever being superficial.

After an introduction on the nature and function of mineral resources, the evolution of their special uses, and their legal character as national or private property, the influence of the hidden treasures under the ground upon the history of the nations receives elaborate treatment. We learn how flint and amber were first utilized by primitive man for means of defense and adornment; how the wish to outdo anything that existed in the monumental line was nursed by the discovery of the diorites and basalts of Egypt; how Rome, through the contact with Carthage, the London of antiquity, and the conquest of her mines in Africa, Sardinia, and Spain, underwent the transformation from an agricultural into an industrial and engineering nation, quite similar to that which the United States experienced after the discoveries of the coal and oil fields of Pennsylvania, and the copper and iron of Lake Superior. It was by means of Spanish money that Hannibal made his famous invasion into the heart of Italy, and when Rome had wrested from Carthage the lead and silver of Cartagena, the mercury of Almaden, the copper of Rio Tinto and Tharsis, the tin of Galicia and Portugal, the gold of Grenada and the Douro, its final triumph in the struggle was assured.

We learn how the discovery of the mineral wealth of the West Indies killed the until then flourishing mining industries of Italy and Spain and, what was worse, also killed the industry and enterprise of the two nations, and how the attraction of the treasures of the Far West, of Australia, and South Africa, opened up these countries to civilization. A special study is given to the rise and decadence of mining camps and towns. Then the evolution of mining itself from the earliest times to the present is taken up, with a description of modern mines and mining, their apparatus and dangers, the life and conditions of the miners in the various kinds of mines, the influence of the output of

the mines on the financial situation, the probable duration of the existing (or known) supplies of mineral resources and their preservation, etc. American readers ought to take especial notice of the fact that mortality among coal miners in the U. S. had, from 2.59 per cent. in 1898, risen to 5 per cent. in 1907, while in the latter year it was 1.97 per cent. in Prussia and 1.04 per cent. in France.

On the average, however, the life of the miner is not particularly injurious to health. In England, for instance, for every 1,000 male deaths among the whole population there are only 925 among miners, against 1,176 among quarry workers, 1,221 hodcarriers, 1,301 iron and steel workers, 1,370 printers, 1,392 chemical workers, 1,706 keramic workers, 1,725 hotel employees, and 1,829 dock hands. Longevity, too, among the miners is greater, in France, than among farmers and commercial people, and only 1/7 lower than the average for all industries. The influence of deaths due to accidents is more than compensated through the lesser death rate from alcoholism, nervous and liver diseases, and consumption, which is due to the stricter discipline that must be enforced in the mine on account of its dangers. It seems proved, too, that the great accidents which swell the mortality figures occur only, as a rule, whenever large numbers of untrained men, not grown up under the régime of the mining community, are employed in the mines. This observation will most likely account for the large number of casualities in America where a regular mining population, in which the traditions of the profession are handed down for generations from father to son, as is the case in Central Europe, is not found at all.

MARTHA K. GENTHE.

The Earning Power of Railroads, 1909. Compiled and Edited by Floyd W. Mundy. 428 pp., and index. James. K. Oliphant & Co., New York, 1909.

A hand-book for investors and others interested in railroad securities. The fundamental principles which the investor must apply in studying the value of railroad stocks or bonds are explained in a general way and the statistics, relating to earnings, mileage, capitalization, tonnage, etc., are so arranged as to facilitate the comparison of these data for each railroad.

Railroad Promotion and Capitalization in the United States. By Frederick A. Cleveland and Fred Wilbur Powell. xviii and 368 pp. Longmans, Green & Co., New York, 1909. $2.

A work of great value to all interested in the history of transportation development in the United States. The intricate subject is presented with much clearness, which is especially emphasized by the fact that the literary style is concise and the whole topic, while discussed in its many phases, is kept within reasonable compass. A striking feature is the bibliography filling nearly fifty pages. The cost of this part of the work which involved the collection of scattered materials from numerous libraries where early periodicals and documents might be found was largely borne by the Carnegie Institution.

Official Proceedings of the Eighteenth National Irrigation Congress. Held at Pueblo, Colorado, Sept. 26–30, 1910. Edited by Arthur Hooker Gehman. xxiv and 412 pp., 2 ills. The Franklin Press, Pueblo, Colorado.

A verbatim report of the transactions of the Congress, and of the papers read before it.

Lehrbuch der Erdkunde für höhere Schulen. 6 Teilen. Herausgegeben von A. Steinhauff, und Prof. Dr. M. G. Schmidt. I Teil, 75 pp., M. 1.20; II Teil, 71 pp., M. 1.20; III Teil, 115 pp., M. 1.60; IV Teil, 63 pp., pf. 80; V Teil, 70 pp., pf. 80; VI Teil, 130 pp, M. 1.60. With many photo-engravings and other illustrations. Druck u. Verlag von B. G. Teubner, Leipzig, 1910.

A series of geographical text-books for higher schools. The size of the books (large octavo) facilitates the insertion of a large number of photo-engravings and pictures in colors, selected as types illustrating geographical facts or principles. This is an innovation, for most of the geographical texts in Germany have few or no illustrations. No maps are given and the student has to depend upon the excellent school atlases, as is usual in German schools. The author has prepared the text with a view to awaken and sustain the interest of the student, to emphasize causal relations and to give clear accounts of physical features, and other phases of physical geography. The sixteen pages given to the forms of the land in Africa and their relation to the inhabitants and their activities is one of the best summary accounts in German text-books.

A Physiographical Introduction to Geography. By A. J. Herbertson, M.A., Ph.D. 120 pp., maps and diagrams. Clarendon Press, Oxford, 1910.

An introduction to the "Junior Geography" and "Senior Geography" in the series of "The Oxford Geographies." It gives brief and simple treatment to physiographic features, climatic regions, the ocean, plant and animal regions, distribution of the human race and of its activities and the raw materials it uses, means of transport and a chapter on latitude, longitude and map nets. The maps are numerous and good. A useful book to introduce geography courses in the higher grades of the public schools.

A Man of War in the East Indies. Being the Log of Commission of H.M.S. "Proserpine." 1908–1910. With a full account of the blockade of the Somali Coast, and the prevention of gun-running in the Persian Gulf. By A. W. Furness. 243 pp., illustrations and map. The Westminster Press (Gerrards, Ltd.), London, 1910. 5s

Interesting as a picture of events on a British man-of-war. It depicts the life of the British blue-jacket at sea. The narrative covers a period of about two years during which the *Proserpine* visited many ports from Gibraltar to Colombo, in the Mediterranean, the Arabian Sea and the Indian Ocean.

Economic Geology. With special Reference to the United States. By Heinrich Ries. New and Revised Edition. xxxi and 589 pp., 237 illustrations and maps in the text, 56 plates and index. The Macmillan Co., New York, 1910. $3.50.

This standard work has reached its third edition. An extended review of it appeared in the *Bulletin* (Vol. 38, p. 393, 1906). Our knowledge of economic geology has expanded to such an extent since the first edition was printed in 1905, that Dr. Ries has made a complete revision of the book. He has added considerable matter dealing with the principles of the subject, also descriptive of new found occurrences. As in the earlier editions, the most important occurrences and the general geological or mineralogical matter appear in larger type. The statistics have been brought down to the time of publication. It is the most satisfactory text-book on the subject, and the questions treated are so fundamentally related to the prosperity of the country that the book cannot fail to interest and edify all intelligent readers.

Tables for the Projection of Graticules, for Maps on the scale of 1:1,000,000. 6 pp. Prepared by the Geographical Section of the General Staff, War Office, London, 1910. 2d.

Table 1, shows values of 1° arcs of the meridian in miles and in inches at the scale of 1:1,000,000, from latitude O° to 60°. Table 2, gives the co-ordinates of the intersections of the parallels of latitude and meridians in miles, also in inches at the scale of 1:1,000,000.

Buried Herculaneum. By Ethel Ross Barker. xvi and 253 pp., illustrations, plans and index. Adam and Charles Black, London; The Macmillan Co., New York, 1908. $3.

Most visitors to Naples pass by the excavations at Herculaneum because there is so much more to see at Pompeii. About 20,000 people visit the latter city for every 1,000 who stop at Herculaneum. Over two centuries ago, however, half of buried Herculaneum had been brought to light and many mosaics, frescoes, bronzes, etc., were taken away. Then renewed outpourings of Vesuvius buried the city again and little has since been done to renew the work of excavation which has made such great progress at Pompeii. The fact that the Government now proposes to make excavations on a large scale will renew interest in the buried city that shared the fate of Pompeii in the great eruption of 79 A.D., when it was overwhelmed in a stream of liquid mud. We have to go chiefly to the Museum at Naples to see the art treasures which, two centuries ago, were recovered from Herculaneum. The supreme interest of the town lies in the unique bronzes and marbles that were found there. It may be that the excavations now proposed will bring to light many other precious relics of ancient art.

This is a timely book. The author tells of the life in the town so far as we have learned it, of its history and excavations, describes its general plan, the theatre, the Basilica, the temples and other public edifices and private dwellings as excavations, thus far, have revealed them. Several chapters are given to the prolific subject of the treasures of Herculaneum, and the book contains a large number of photo-engravings of these sculptures, frescoes, bronzes, and marbles with descriptions of them. These illustrations will be a revelation to many who have not seen the originals. This part of the book comprises about 80 pages. There are numerous plans and illustrations of excavated buildings, etc.

Brief List of Meteorological Text-Books and Reference Books. A selection of works suitable for General, Scientific and University Libraries in the United States. By C. F. Talman, Librarian, U. S. Weather Bureau. Pp. 18. Second edition. U. S. Department of Agriculture, Weather Bureau. 8vo. Washington, 1910.

The Weather Bureau has issued a second edition of the useful list of meteorological text and reference books, compiled by the Librarian. This bibliography may be warmly recommended to all teachers and students of meteorology and climatology, who will find it a well-classified and serviceable list for all general purposes. In addition to the names of the authors and the titles, there are included, in most cases, brief statements regarding the general character and scope of the various works in the list. R. DEC. WARD.

CURRENT GEOGRAPHICAL PAPERS

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NEW MAPS

NORTH AMERICA

U. S. GEOLOGICAL SURVEY SHEETS

ALASKA. (a) Topographic map of Berners Bay Region, Alaska. 1:62,500 = 0.9 mile to an inch. 3 colors. Contour interval 50 feet; (b) Geologic map of Berners Bay Region. 1:62,500. 6 colored symbols. Illustrate *Bull.* 446, "Geology of the Berners Bay Region, Alaska," by Adolph Knopf, Washington, 1911.

UNITED STATES. Drainage Basins of the Southern Appalachian Mountains. 1 inch = 34 miles. 3 colors. Illustrates *Prof. Paper* 72, "Denudation and Erosion in the S. Appalachian Region and the Monongahela Basin," by L. C. Glenn, Washington, 1911. [Each of the drainage basins is bounded by red lines.]

UNITED STATES. (a) Map of vicinity of Austin, Tex. 1 inch = 6 miles. [Showing location of quarries, etc.]; (b) Map showing Slate Area of Arkansas. 1 inch = 50 miles; (c) Map showing outcrop area of Niobrara formation in South-Central Nebraska. 1 inch = 30 miles. [Shows limestones used for cement manufacture in the Republican Valley]; (d) Map Showing principal Areas of gravel Deposits in Pittsburg District, Pa. 1 inch = 14 miles. [All maps black.] Illustrate *Bull.* 430-F "Advance Chapter from Contr. to Econ. Geol. Part 1, 1909, Structural Materials," by E. F. Burchard and others. Washington, 1910.

UNITED STATES. (a) Map showing Extent of Phosphate Reserve of Idaho, Utah and Wyoming, May, 1910. 1 inch = 30 miles; (b) Preliminary Map and Structure Sections of the Georgetown Canyon Phosphate Area, Idaho. 1 inch = 1 mile; (c) Geologic Map of Sublett Mts., Wyoming and Adjacent Portions of Idaho. 1 inch = 1 mile. [Shows extent of phosphate outcrops, with sections and analyses of phosphate beds.]; (d) Preliminary Geologic Map and Structure Section of the Cokeville Area, Wyoming. 1 inch = 1 mile; (e) Geologic Map of the Crawford Mts., Utah. 1 inch = 1 mile. [Shows extent of phosphate outcrops.]; (f) Geologic Map of Phosphate Deposits near Woodruff, Utah. 1 inch = 1 mile. All maps black. Illustrate *Bull.* 430-H, "Preliminary Report on the Phosphate Deposits in Southeastern Idaho and Adjacent Parts of Wyoming and Utah." Washington, 1910.

UNITED STATES. Map showing condition of Astronomic Location and Primary Control to Jan. 1, 1909. 1 inch = 270 miles. 3 colors. *Bull.* 440, "Results of Triangulation and Primary Traverse for 1906-07-08," by R. B. Marshall, Chief Geographer. Washington, 1910. [Red shows astronomic stations and areas tinted brown are controlled by triangulation or traverse.]

U. S. HYDROGRAPHIC OFFICE CHARTS

Pilot Chart of the North Pacific Ocean, Oct., 1910, April, 1911.
Pilot Chart of the South Pacific Ocean, Sept., Oct., and Nov., 1910.
Pilot Chart of the North Atlantic Ocean, Aug., and Sept., 1910.

U. S. WEATHER BUREAU CHARTS

Meteorological Chart of the North Atlantic Ocean. Oct., 1910, Feb., 1911.
Meteorological Chart of the North Pacific Ocean. Oct., 1910, Feb., 1911.
Meteorological Chart of the Great Lakes. Feb., 1911.
Meteorological Chart of the Indian Ocean. Feb., 1911.

U. S. DEPT. OF AGRICULTURE MAPS

UNITED STATES. Soil Survey Map of the Woodland Area, Cal., 1:62,500; Alkali Map of the Woodland Area, Cal., 1:62,500. Soil Survey Maps of Clay Co., Miss., Pike Co., Ga., and Titus Co., Tex., 1:63,360. Soil Survey of Tallapoosa Co., Ala. 1 inch = 1 mile. [Colors.] [With descriptive letter press.]

BUREAU OF THE CENSUS MAPS

UNITED STATES. Maps of Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Oklahoma, Tennessee, and Texas, showing production of cotton in 1909. No scale. Black. Illustrate *Bull.* 107, "Cotton Production, 1909." [Shows by symbols the distribution and intensity of cotton raising in these states.]

U. S. LAKE SURVEY OFFICE MAPS

UNITED STATES. Magnetic Variations over Lake Superior, for 1910. Prepared under the direction of Major C. S. Riché. 1:1,200,000 = 18.93 miles to an inch. 3 colors. Illustrates "Survey of Northern and Northwestern Lakes," *Bull.* No. 19, Supp. No. 3, U. S. Lake Survey Office, Detroit, Mich., 1910.

PANAMA COMMISSION MAPS

PANAMA CANAL. (a) Map of Canal Zone, to accompany the Annual Report of the Commission. 1 inch = 1.6 mile to an inch. 5 colors. *Ann. Rep.* Isthmian Canal Comm., 1910, Wash. [Topography shown by hachures. Gives boundary lines of Canal Zone, center line of Canal, and relocated route of the Panama RR., dams and locks]; (b) Contour Map and Profile of the Panama Canal. Showing Central Division Dumps and Excavation for the Fiscal Year ending June 30, 1909. 1:40,000; (c) Map of Panama showing Canal Zone and water shed of Rio Chagres. 1:100,000 = 1.57 mile to an inch. 4 colors. With *Ann. Rep.* Pan. Can. Comm., 1909, Washington.

NEW YORK. Map of New York showing distribution of Salina Strata. 1 inch = 25 miles. 3 colors. By D. H. Newland. Illustrates "Gypsum Deposits of New York," by D. H. Newland and Henry Leighton, in New York State Museum, *Bull.* 143, Albany, 1910. [The workable gypsum deposits are restricted to the Salina stage of the Upper Siluric system. The Salina Strata are shown in red.]

CANADA. Explored Routes on parts of Albany, Severn, and Winisk Rivers, etc. Northern Ontario and N. W. Territories. 1:506,880 = 8 miles to an inch. 4 colors. Accompanies "*Report* on a part of the N. W. Terr. drained by the Winisk and Attawapiskat Rivers," by William McInnes. No. 1080. Dept. of Mines, Geol. Surv. Branch, Ottawa, 1910. [Geological formations shown in colors along routes followed by 17 exploring parties from 1871 to 1907.

CANADA. Lake Nipigon, Thunder Bay District, Ontario. 1:253,440 = 4 miles to an inch. [11 colored symbols for formations.] In *Mem.* 1 "Geology of the Nipigon Basin, Ont.," by Alfred W. G. Wilson. Dept. of Mines, Geol. Surv. Branch, Ottawa, 1910.

CANADA. (a) Edmonton, Alberta. 1:31,680 = 0.5 mile to an inch. 3 colors. Contour interval 25 feet. [Plan of the City with contours of elevation.]; (b) Edmonton, 1:31,680. 3 colors. [Isobaths showing probable depth, in feet below surface, of Clover Bar coal seam which underlays the city on both sides of the Saskatchewan.] Illustrate "The Edmonton Coal Field." By W. B. Dowling, *Memoir* No. 8-E, Dept. of Mines, Geol. Survey Branch, Ottawa, 1910.

CANADA. (a) Tantalus Coal Area, Yukon Terr. 1:126,720 = 2 miles to an inch, [13 colored symbols for formations and coal outcrop.]; (b) Braeburn-Kynocks Coal Area, Yukon Terr. 1:126,720. [11 colors and symbols for formations and coal outcrops]; Illustrate "Preliminary Memoir on the Lewes and Nordenskiöld Rivers Coal District, Yukon Terr.," by D. D. Cairnes. *Memoir* 5, Dept. of Mines, Geol. Surv. Branch, Ottawa, 1910.

CANADA. (a) Proposed Forest Reserve on the Eastern Slope of the Rocky Mts. 1 inch = 35 miles. 3 colors; (b) Basin of the Ottawa River, 1 inch = 35 miles. 3 colors. Illustrate *First Ann. Rep't.*, Comm. of Conservation, Canada, Ottawa, 1910.

CANADA. Part of the Selkirk Range adjacent to Mount Sir Sandford. 1:125,000 = 1.97 miles to an inch. 3 colors. By Howard Palmer, 1908-09. Illustrates "Explorations About Mount Sir Sandford, B. C." same author. *Geogr. Journ.*, Vol. XXXVII, No. 2, 1911, London. [Constructed from photographs and prismatic compass bearings, adjusted to points of the government triangulation.]

CANADA. Index to Townships in Manitoba, Saskatchewan, Alberta and British Columbia. 1:2,217,600 = 35 miles to an inch. 5 colors. With *Ann. Rep.* of the Topogr. Surveys Branch, Interior Dept., 1908-1909, Ottawa, 1910.

CANADA. (a) Sketch Map of Part of the Railway Belt, British Columbia. 1 inch = 4 miles. 4 colors. With *Report* of P. A. Carson. [Shows topographical features in the Basins of the Blaeverry River, Bush River, Gold Creek and their confluence together with the Continental Divide, northwest from Mt. Freshfield]; (b) Sketch Plan, showing topography of the eleventh base line across ranges 8 to 19, west of the fifth meridian. 1 inch = 2.5 miles. With *Report* of

B. J. Saunders. [This region lies on both sides of the Saskatchewan R. Details as to soils, vegetation, etc., indicate that the district is suitable for settlement]; (c) Map of the Boundary between British Columbia and Yukon Territory from Tatshenshini R. to Teslin Lake. 1 inch = 80 chains. 3 colors. [Main topographical features with many elevations in figures on both sides of the boundary are shown.] In *Ann. Rep.* of the Topogr. Surveys Branch for 1908-09, Dept. of Interior, Ottawa, Can., 1910.
1908, 3 Vols., Argentine Meteorological Office, Buenos Aires, 1909.

MEXICO. Croquis geologico y topográfico del Valle de Ixmiquilpan. 1:200,000 = 3.14 miles to an inch. 7 colors showing formations. 2 profiles with "Estudio hidrológico del Valle de Ixmiquilpan, Hidalgo." Por el Ing. Trinidad Paredes. *Parergones* del Inst. Geol. de Mexico, Tome III, Núm. 3. Mexico, 1909.

SOUTH AMERICA

ARGENTINA. (a) Map of railways of the Argentine Republic. January, 1909. 1:2,500,000 = 39.46 miles to an inch. 7 colors. 7 insets on larger scales show R.R. termini in important towns. Guage of R.R's. shown; (b) The Argentine Republic, 1909. 1:8,500,000 = 134.10 miles to an inch. 4 colors. [Shows distribution of hydrometric stations.] (c) Argentine Republic, 1909. 1:8,500,000. 6 colors. [Shows distribution of meteorological stations.]; (d) Argentine Republic, 1909. 1:8,500,000. 5 colors. [General map of the Republic.]; (e) Hypsometric map of the Argentine Republic. 1:16,000,000 = 252.53 miles to an inch. 3 colors. [Seven tints of brown for lands above 100 meters, and blue for lands under 100 meters in elevation. Illustrate "Agricultural and Pastoral Census of the Nation. "Stock-Breeding and Agriculture in

AFRICA

GERMAN SOUTHWEST AFRICA. Deutsch-Südwestafrika. Bearbeitet von Paul Sprigade und Max Moisel. Mit Namenverzeichnis. 1:2,000,000 = 31.56 miles to an inch. 6 colors. Verlag von Dietrich Reimer (Ernst Vohsen), Berlin, 1910. Mk. 5. [A good general map with complete nomenclature. Topography in brown wash. The diamond fields are shown along the coast between 24° and 28° S. Lat.]

FRENCH CENTRAL SUDAN. Mission Tilho. (a) Lac Tchad. [Aspect of the Lake in 1908. Based on surveys from Nov., 1907 to May, 1908, together with earlier studies.]; (b) Bahr el Ghazal. [Based on astronomical observations and surveys]; (c) Bodeli et Borkou. All 1:500,000 = 7.89 mlies to an inch. 4 colors. With "Documents Scientifiques de la Mission Tilho (1906-1909)." Ministère des Colonies, Paris, 1910. [Itineraries of the mission and other explorers; contours of elevation, astronomical points established, wells, etc., with much information as to geology, distribution of vegetation, topography, etc. The sheets cover Lake Chad and large areas to the east and northeast of it. They are at present our best source of information relating to this area.]

TRANSVAAL COLONY. Map of the Transvaal Colony revised January, 1909. 4 colors. *Rep't.* of Transvaal Geol. Surv. for 1909, Pretoria, 1910. [Shows areas of completed survey up to end of 1908, and areas completed during 1909.]

TRANSVAAL COLONY. Geological Survey Sheets. 1 inch = 2.3 miles. (a) Plate IX: Portions of Waterberg and Rustenburg Dists; (b) X: Portion of the Waterberg Dist.; (c) XI: Middleburg and Lydenburg Dists.; (d) XII: Portion of Lydenburg Dist.; (e) XIII: Portion of the Marico Dist.; (f) XIV: Map of the Klip River Valley. [Colored symbols show geological formations.] With *Rep't.* Transvaal Geol. Surv., 1909. Pretoria, 1910.

ASIA

CHINA. Chart of the newly established Port of Heungchow and Surrounding District. No scale. 2 colors. Illustrates "Returns of Trade and Trade Reports, 1909. Stat. Series, Nos. 3 and 4." Imperial Maritime Customs. China. Shanghai, 1910.

CHINA. Hoebel's Karte v. China. 1:4,500,000 = 71.02 miles to an inch. 3 colors. Simon Schropp 'sche Landkarten-Handlung, Berlin, 1911. [A notable map of China. It contains over 7,000 names clearly printed so that all are easily read. The terrain is well defined in brown, the provincial boundaries are clearly expressed, and the hydrographic features are well shown. A feature is the spelling of place names in accordance with the provincial dialects, the common practice being to use the Peking dialect for all names. Telegraphs, railroads, mission stations, and much other information are given.]

INDIA. Geological Sketch Map Showing the distribution of the coal fields of the Naga Hills. 1 inch = .8 miles. Black. Illustrates "Some Coal Fields in N. E. Assam," by H. H. Hayden. *Records*, Geol. Surv. of India, Vol. 40, Part 4, Calcutta, 1910.

SUMATRA. Kaart der Tabaksondernemingen ter Oostkust van Sumatra. Tevens aangevende de Koffieondernemingen. Naar de nieuwste gegevens bewerkt door P. de Vries & Zoon. 1:200,000 = 3.14 miles to an inch. J. H. de Bussy, Amsterdam, 1910. Fr. 6.50. [A good cartographic picture of the great tobacco-growing industry in Eastern Sumatra. 13 symbols show the distribution and extent of the tobacco holdings and their communications are detailed. Coffee estates also shown. A list of the tobacco, coffee and rubber companies of East Sumatra accompanies the map.]

AUSTRALASIA AND OCEANIA

WESTERN AUSTRALIA. Geological Map of the Country between Arrino and Northampton. 1 inch = 240 chains. 6 colors. By W. D. Campbell. Illustrates "The Irwin River Coalfield and the Adjacent District from Arrino to Northampton," in *Bull.* No. 38, 1910, same title and author, Geol. Surv., W. Australia, Perth.

WESTERN AUSTRALIA. Geological Sketch Map of the Portion of the Eastern Division traversed by the Canning Survey party, 1907-9, from Wiluna to Hall's Creek. 1 inch = 15 miles. 7 colors. Illustrates "Geol. Observations" by H. W. B. Talbot, *Bull.* 39, Geol. Surv., Perth, 1910. [The geological discoveries noted serve to define the areas over which mineral deposits may be expected.]

NEW ZEALAND. (a) North Island; (b) South Island. Showing Land Transactions, 1909-10. 1 inch = 15 miles. Illustrate *"Rep't.* of Dept. of Lands, New Zealand, for 1909-10" by W. C. Kensington. Wellington, 1910. [Colors show lands available for settlement, lands taken up during the year, etc.]

BISMARCK ARCHIPELAGO. (a) Höhenschichtenkarte von Neu-Hannover. 1:100,000 = 1.57 mile to an inch. 9 tints for elevations, black nomenclature, and routes in red. Inset: Geologische Kartenskizze von Neu-Hannover. 1:300,000 = 4.73 miles to an inch. [6 tints for geological formations]; (b) Höhenschichtenkarte von Nord Neu Mecklenburg. 1:2,000,000 = 3.14 miles to an inch. [9 tints for elevations.] Insets: Geologische Kartenskizze von Nord Neu Mecklenburg. 1:400,000 = 6.33 miles to an inch. [8 tints for formations], and Nordwestspitze der Insel Tatáu. 1:100,000 = 1.57 mile to an inch; (c) Höhenschichtenkarte von Süd Neu Mecklenburg. 1:200,000 = 3.14 miles to an inch. [12 tints for elevations.] Inset: Geologische Kartenskizze von Süd Neu Mecklenburg. 1:400,000 = 6.33 miles to an inch. [12 tints for formations.]; (d) Übersichtskarte von Neu Mecklenburg u. den Nachbargebieten, zur Veranschaulichung der Lage der bekannt gewordenen Terrassen (Höhenangaben in Metern), entworfen von Dr. Karl Sapper, 1909. 1:1,000,000 = 15.78 miles to an inch. Black; (e) Die Verbreitung der Vegetationsformationen auf Neu Mecklenburg u. den Nachbargebieten. Nach eigenen Aufnahmen, nach Aufnahmen von Dr. G. Friederici u. Angaben von Herrn Boluminski u. der deutschen Seekarte entworfen von Dr. Karl Sapper, 1909. Black. [7 symbols for vegetation. 1:1,000,000; (f) Übersichtskarte der Ungefähren Volksdichte auf Neu Mecklenburg u. den Nachbargebieten, entworfen von Dr. Karl Sapper, 1909. Black. [3 symbols for density of population.] 1:1,000,000; (g) Anir-Inseln. (Feni-Inseln, Wöneram, Insel.) Nach Aufnahmen S. M. S. *Planet*, 1908. Mit geologischen Einzeichnungen von Karl Sapper nach dessen eigener Aufnahme

und Friedericis Angaben. 1:150,000 = 2.36 miles to an inch. 4 colors. Illustrate "Wissenschaftliche Ergebnisse einer amtlichen Forschungsreise nach dem Bismarck-Archipel im Jahre 1908. 1. Beiträge zur Landeskunde von Neu Mecklenburg und seinen Nachbarinseln," von Dr. Karl Sapper. *Mitt.* aus den Deutsch. Schutzgeb., Ergänzungsheft, No. 3, Berlin, 1910. [These beautiful maps by Dr. Sapper, show the results of his own surveys and the work of other explorers. The nomenclature is large, the forms of the land are shown by tints, bounded by contours of elevation and the maps are first class examples of German cartography. The routes and surveys of all the explorers who have participated in the work are differentiated. Native paths appear and the values of the curves of elevation, whether approximately exact or conjectural, are indicated. The maps are a great addition to our knowledge of little known islands in the Pacific.]

BISMARCK ARCHIPELAGO. (a) Aufnahmen auf Bougainville, 1908. Von Dr. Karl Sapper. 1:50,000 = 0.79 mile to an inch. 3 colors. 3 sheets, and profile of Dr. Sapper's route in 1:100,000. [Sapper's route survey through the Island supplies the first material for the mapping of the interior of Bougainville. Both profile and route maps contain numerous geological notes and the map shows the direction of all the water courses he crossed]; (b) Buka. 1:200,000 = 3.14 miles to an inch. 3 colors. By Dr. Karl Sapper. [Shows the routes of Sapper and Friederici, gives approximate and conjectural contours of elevation and differentiates between large and small villages. The map makes a large addition to the nomenclature of Buka]; (c) Geologische Kartenskizze von Buka. 1:200,000. 2 colors. Dr. Karl Sapper, 1910. [Locates reefs, and uplifted coral and shows the distribution of andesite, anesitic tuff and mangrove swamps. The map is based upon the observations of Friederici and Schön and upon Sapper's surveys. A profile through the island by Engineer Schön is given.] Accompany papers on Buka and Bougainville, by Sapper, Friederici, and Schön in *Mitt.* aus den Deutsch. Schutzgeb. 23. Band, 4 Heft, 1910, Mittler und Sohn, Berlin.

EUROPE

AUSTRIA-HUNGARY. Karte der Ankogel-Hochalmspitzgruppe. 1:50,000 = 0.79 mile to an inch. 3 colors. Contour interval 25 meters. With "Talstudien im Gebiete das Ankogel und der Hochalmspitze by Prof. Dr. E. Stummer. *Deutsch. Rund. f. Geogr.*, xxxiii Jahrg., 4 Heft, p. 159, 1910.

AUSTRIA-HUNGARY. (a) Slovakien, Galizien, Bukowina, Siebenbürgen. No scale. 6 colors; (b) Deutschböhmen, Tschechischböhmen, Mähren, Schlesien. No scale. 5 colors; (c) Slovenien. No scale. 6 colors. Drei Karten zur Ergänzung der Triaskarte. Von Heinrich Hanau. G. Freytag & Berndt, Vienna, 1911.

AUSTRIA-HUNGARY. Karte des politischen Bezirkes Hietzing-Umgebung. 1:100,000 = 1.57 mile to an inch. Colors. Freytag & Berndt, Vienna, 1910. [2 sheets of this region west of Vienna, one showing political subdivisions by color contrasts and topographic forms by contours with ten meters interval; the other using light and shade for surface forms and red for political boundaries. These sheets would be useful in the class-room to illustrate different methods of carotographic treatment for the same data.]

AUSTRIA-HUNGARY. Triaskarte der Habsburger Monarchie. 1:1,500,000 = 23.67 miles to an inch. 4 colors. Von Heinrich Hanau. G. Freytag & Berndt, Vienna, 1911, K. 3. [The name of the map is explained by the author's inclusion of Bosnia with Austria and Hungary as a part of the Hapsburg Monarchy. A good map with large nomenclature and unusual attention to the myriads of little lakes scattered over the Hungarian plain. The relief forms are not shown but the hydrography is minutely mapped.]

AUSTRIA-HUNGARY. Königreich Böhmen und Erzherzogtum Böhmen-Eger. No scale. 4 colors. Von Heinrich Hanau. G. Freytag & Berndt, Vienna, 1911. [Accompanied by explanatory text.]

AUSTRIA-HUNGARY. Verkehrs-Karte von Österreich-Ungarn. 1:1,500,000 = 23.67 miles to an inch. 5 colors. G. Freytag, Vienna, 1911. K. 2. 40. [The

edition of 1911, fully maintains the reputation of this railroad map of Austria-Hungary. It includes insets on larger scales of Vienna, Budapest and North Bohemia and a railroad map of the Balkan Peninsula in 1:3,000,000.]

THE ALPS. Hand und Reise-Karte der Alpen Länder. Bearbeitet von Vincenz von Haardt. 1:1,000,000 = 15.78 miles to an inch. Ed. Hölzel, Vienna. [A superior tourist map (2nd edition) showing all communications and many elevations in meters.]

CORSICA. Eiszeit—Karte von Korsika. 1:300,000 = 4.73 miles to an inch. Black. Illustrates "Die Eiszeit auf Korsika" etc., by Dr. Roman Lucerna, in *Abhandl.* der k.k. Geogr. Ges. in Wien. ix Band, No. 1, 1910. Vienna. [43 Glaciers are mapped and named and the most important moraines are shown.]

FRANCE. Carte des gisements de Coquilles Comestibles, de la Rade de Brest, et des Rivières de Landerneau et de Châteaulin. 1:28,000 = 0.45 mile to an inch. 6 colors. Par Jos. Guérin-Ganivet. Illustrates *Bull.* de l'Inst. Océanogr., No. 195, 1911.

GERMANY. Strassen-Karte der Provinz Sachsen. 2 sheets. 1:300,000 = 4.73 miles to an inch. 4 colors. G. Freytag & Berndt, Vienna and Leipzig. 1910. [An unexcelled road map of this Prussian Province.]

GERMANY. (a) Kartenskizze der Temperaturverhältnisse im Böhmerwald. 1:1,000,000 = 15.78 miles to an inch. 2 colors; (b) Karte der Niederschlagshöhen im Bömerwald. 1:1,500,000 = 23.67 miles to an inch. 2 colors; (c) Übersichtskarte des Bayerisch—Böhmischen Waldgebirges. 1:250,000 = 3.95 miles to an inch. Black. Illustrate "Morphologie des Böhmerwaldes," by Max Mayr. *Mitt. Geogr. Ges.* in München. 5. Band, 2 Heft, 1910, München.

GERMANY. HAVELWINKEL. Lage der Siedlungen. 1:200,000 = 3.14 miles to an inch. 4 colors. Illustrates "Beiträge zur Siedlungskunde des Havelwinkels. II Teil." Von Max Bolle. *Mitt.* des Sächsisch-Thüringischen Ver. f. Erdk. zu Halle, a. S. 34 Jahrg., 1910. [Shows the angle formed by the junction of the Elbe and Havel, with all the settlements and the nature of the soil upon which they stand.]

IRELAND. Map of Mean Annual Rainfall over Area including Counties of Dublin, Wicklow, Meath and Kildare. 1 inch = 6 miles. 2 colors. Illustrates "On the Distribution of Mean Annual Rainfall . . . Over an Area including the Counties of Dublin . . . A Study in Local Variations of Rainfall." By William J. Lyons, *Sci. Proc.* Roy. Dublin Soc., Vol. xii, (N. S.), No. 30, May, 1910, Dublin.

NETHERLANDS. De Zuiderzee en haar Afwateringsgebied in Nederland. No scale. 3 colors. Illustrates "Wat de afsluiting en droogmaking der Zuiderzee eigenlijk beteekent," by A. A. Beekman. *Tijdsch.* Kon. Nederl. Aardr. Genoots. Tweede Ser., Deel XXIII, No. 1, 1911, Leiden. [Shows areas reclaimed for agriculture from the Zuider Zee.]

OCEANOGRAPHICAL

ATLANTIC-MEDITERRANEAN. Campagne Scientifique de la *Princesse Alice,* 12 Mars-16 Septembre 1910. Itinéraire. Mercator Projection. Black. Illustrates paper, same title, in *Bull.* l'Inst. Oceanogr., No. 182, Oct. 30, 1910. Monaco. [Stations are numbered; soundings in meters.]

POLAR

ARCTIC. Die Wichtigsten Nordpolarreisen des XIX und XX Jahrhunderts in zeitlicher Folge und mit besonderer Berücksichtigung derjenigen, deren Ziel die Erreichung des Pols war. 1:7,500,000 = 118.37 miles to an inch. Bearbeitet von P. Sprigade u. M. Moisel. D. Reimer (E. Vohsen) Berlin, 1910. [An excellent presentation of facts relating to Arctic discovery. The regions explored have different colors, according to the nationality of the explorers. The routes of exploring vessels and sledge parties are similarly colored. On the margins are concise notes of the work done by each expedition. The hydrography is well shown. Limits of pack, drift, and inland ice are indicated with two shades of blue for sea depths, but no attempt is made to denote the land elevations and no soundings are given.]

EDUCATIONAL MAPS

GERMAN SCHOOL WALL MAPS. (a) Kuhnert, Physikalische Erdkarte in Mercators Projektion mit Darstellung der Meersströmungen. Bearbeitet von Prof. Dr. G. Leipoldt, Dresden. 5 colors; (b) Asia, Physical Wall Map. Designed by M. Kuhnert and Prof. Dr. Gust. Leipoldt. 1:600,000 = 94.6 miles to an inch. 5 colors; (c) Verkehrskarte von Mitteleuropa. Politische Karte und Angabe der Eisenbahnen, Wichtigen Alpenstrassen, Dampferlinien, und Telegraphenverbindungen. Von Prof. Dr. Gustav Leipoldt. 1:850,000 = 13.41 miles to an inch. 6 colors; (d) Physik. polit. Schulwandkarte von Europa. In Verbindung mit Prof. Dr. G. Leipoldt, gezeichnet von M. Kuhnert. 1:3,000,000 = 47.34 miles to an inch. 5 colors; (e) Schulwandkarte vom Königreich Bayern, gez. von M. Kuhnert. 1:375,000 = 5.91 miles to an inch. 5 colors. Inset Politische Übersicht vom Königreich Bayern. 4 colors. Verlag: A. Müller-Fröbelhaus, Dresden. American Agents, Goder-Heimann Co., Chicago, 1910.

[These maps are part of a good series of school wall maps, well adapted for large class-rooms. Most detail may easily be seen from the rear seats. Elevations are shown by deepening shades of brown merging into black and by vivid contrasts between light and shade. Map a, includes sea currents, with red for warm and blue for cold streams; it does not indicate however that the Gulf Stream, a little east of Newfoundland, becomes merely a slow drift. Map b, with English text, represents the high and lowlands of Asia almost with the effect of a relief map. The range which Sven Hedin found extending across southern Tibet is faithfully reproduced. The relief effect is too pronounced in the northeast of Asia for the Stanavoi Mts. are not a continuous range nor so superlative among the mountain features as is represented. The bathymetrical coloring gives a good idea of the continental shelf and ocean floor. The surface of the Caspian sea should have been indicated as standing some 85 feet below sea level. In map c, differing thicknesses of red lines show the relative importance of land transportation routes. Map d, gives an expressive picture of the North Europe lowlands, the plateaus and mountain regions. Map e, on a much larger scale than the other maps, shows the adequacy of the means employed to give a sharp effect of relief on a flat surface. This series has striking merits of its own and will occupy a good place among German school maps.]

ATLASES

Stieler's Atlas of Modern Geography. 100 Maps with 162 inset maps, engraved on copper. Adapted for the use of the English-speaking public. By B. V. Darbishire, M. A. Ninth Edition. Justus Perthes, Gotha, 1909. $15.

This issue of the Ninth edition, removes, as far as practicable, the difficulty which users of the atlas, who cannot read German have experienced. All references, explanations of symbols, and abbreviations, etc., are now given on the back of each map in four languages. The reader therefore who knows one of these languages (English, French, Italian, Spanish) has as near an approach to Stieler in the language he understands, as it is possible to give him without relettering the whole of the maps. This scheme increases the value of the atlas as an international work.

In his preface to the present issue, Mr. B. V. Darbishire, an English cartographer, of Trinity College, Oxford calls attention to some of the methods and merits of Stieler's Atlas which are well worth the attention of many map houses. Every large scale map is based on original material. "Maps in other atlases are held to be simply non-existant and the compiler of the map in Stieler gets the information he requires from official surveys, and, in the case of less-known countries from the surveys and sketches of explorers. Each map is the work of a scientifically trained geographer well qualified to sift the material placed at his disposal." On each sheet proper value is given to the relief of the land without which a true map picture cannot be given." This international edition will be valued by thousands who have found the German language to be an impediment in their use of the Stieler atlas.

OTHER ACCESSIONS

NOV.–DEC., 1910.

AMERICA

BARBER, JOHN W. and HOWE, HENRY. Historical Collections of the State of New York, etc. [Map], etc. New York, S. Tuttle. 1841. sm. 4to.

COLTON, WALTER. Three Years in California. [Map], etc. New York, A. S. Barnes & Co. 1852. 12mo.

GREATOREX, ELIZA. Landmarks of Old New York. [60 Plates in Portfolio] [New York, 1875?].

HANBURY, DAVID T. Sport and Travel in the Northland of Canada. (Maps, etc.) London, Edward Arnold. 1904. 8vo.

HOTCHKIN, JAMES H. A History of the Purchase and Settlement of Western New York, and of the Rise, Progress, and Present State of the Presbyterian Church in that Section. [Frontispiece] New York, M. W. Dodd. 1848. 8vo.

LANDENSIO, EUGENIO. Escursion a la Caverna de Cacahuamilpa y Ascension al Crater del Popocatepetl. [Illustrated] Mexico, Impr. del Colegio del Tecpan. 1868. 8vo.

LEONARD, JOHN WILLIAM. History of the City of New York. 1609-1909, etc. (Illustrations) New York, Journal of Commerce and Commercial Bulletin. 1910. large 8vo. *Gift.*

MASSACHUSETTS HISTORICAL SOCIETY, Proceedings of the, October, 1909-June, 1910. Vol. XLIII. (Maps, etc.) Boston, Published by the Society. 1910. 8vo.

MORLEY, FREDERICK. Michigan and Its Resources, etc. Compiled by ——. (Map), etc. Lansing, W. S. George & Co. 1881. 8vo.

PARKER, NATHAN H. The Kansas and Nebraska Handbook for 1857-8. With a New and Accurate Map. Boston, John P. Jewett and Co. 1857. 12mo.

SNOWDEN, RICHARD. History of North and South America. From its Discovery, to the Death of General Washington. 2 Vols. in 1. [2 Maps.] Philadelphia, Johnson & Warner. 1811. 12mo.

AFRICA

EGYPT EXPLORATION FUND.. Thirtieth Memoir; The XIth Dynasty Temple at Deir El-Bahari, Part II. By Edouard Naville. With Architectural Descriptions by Somers Clarke. (Plates) London, Egypt Ex. Fund. 1910. 4to.

ASIA

ALCOCK, SIR RUTHERFORD. Art and Art Industries in Japan. Illustrations. London, Virtue and Co. 1878. 8vo.

ANSTEY, T. CHISHOLM. Crime and Government at Hong Kong. A Letter to the Editor of the "Times" Newspaper; etc. London, Effingham Wilson. 1859. pr. 8vo.

BRETON, [DE LA MARTINIÈRE, J.-B.]. China: its Costume, Arts, Manufactures, &c. Edited principally from the originals in the cabinet of the late M. Bertin: with Observations, . . . by M. ——. Translated from the French. 4 Vols. in 2. Plates. London, Howlett and Brimmer. 1824. 8vo.

COLDSTREAM, WILLIAM. (*Editor.*) Records of the Intelligence Department of the Government of the North-West Provinces of India during the Mutiny of 1857. . . Arranged under the Superintendence of Sir William Muir, etc. 2 Vols. Edinburgh, T. & T. Clark. 1902. 8vo.

CUMMING, C. F. Gordon. Wanderings in China. 2 Vols. (Map), etc. Edinburgh, William Blackwood & Sons. 1886. 8vo.

DIXON, WILLIAM GRAY. The Land of the Morning. An Account of Japan and its People, etc. Map, etc. Edinburgh, James Gemmell. 1882. 8vo.

DOBEL, PETER. Travels in Kamtchatka and Siberia; with a Narrative of a Residence in China. 2 Vols. [2 Illustrations.] London, Henry Colburn and Richard Bentley. 1830. 12mo.

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